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> *Must-Know*

Challenging Maths Word Problems

Book

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Based on current Primary Mathematics Syllabus

- Improves student's ability to solve challenging word problems
- Encourages critical thinking
- Various problem-solving strategies revealed
- Step-by-step solutions provided

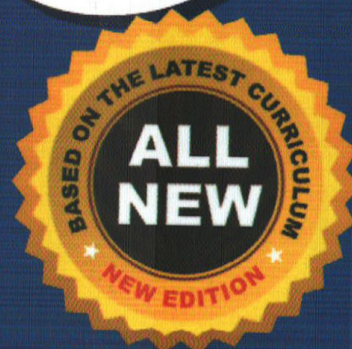


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- Sample problems to test creative and critical thinking skills
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101



> Must-Know

Challenging Maths Word Problems

Book

6

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Name: _____

Class: _____

Preface

101 Must-Know Challenging Maths Word Problems Book 6 presents word problems that test on important concepts so students can learn to **apply general mathematical problem-solving strategies and heuristics confidently.**

What's in this book?

This book comprises word problems often encountered by students in their tests and examinations. The questions are categorized into respective topics in accordance with the current **Primary Mathematics Syllabus.**

Detailed step-by-step workings are included in the answer key for every question to show how a problem is solved. **Diagrams and mathematical models** are provided in most solutions to aid students in understanding the problem-solving processes.






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Develop and hone creative and critical thinking skills. Learn effective strategies to conquer problems sums.

The Editorial Team

Contents

| Question Number | Learning Objective | Page Number |
|--------------------------------|--|-----------------|
| 1 ~ 19 | The Four Operations of Whole Numbers  | 1 ~ 7 |
| 20 ~ 50 | Measurement | 8 ~ 22 |
| 51 ~ 62 | Fractions | 22 ~ 26 |
| 63 ~ 77 | Distance, Speed and Time  | 26 ~ 32 |
| 78 ~ 88 | Ratio | 33 ~ 38 |
| 89 ~ 101 | Percentage  | 38 ~ 44 |
| Solutions 1 ~ 101 | | S1 ~ S39 |

Question**1**

Peter answered 15 questions on a quiz and obtained 29 points. If 3 points were given for each correct answer and 1 point deducted for each wrong answer, how many questions did Peter answer correctly?

Answer: _____

Question**2**

A box contained 480 beads of three different colours. When 18 yellow beads were added in, 33 orange beads were taken out and the number of black beads was doubled, there was then an equal number of beads of each colour. How many beads of each colour were there at first?

Answers: _____ yellow beads

_____ orange beads

_____ black beads

Question**3**

Angie had some red and blue beads. 40% of her beads were red. When she lost 50 blue beads, the number of blue beads was reduced by $\frac{1}{3}$ its original number of beads. How many beads did Angie have in the end?

Answer: _____

Question**4**

There were 820 orange buttons in a container. The number of orange buttons was 160 fewer than the number of yellow buttons and 210 more than the number of green buttons. $\frac{1}{3}$ of the total number of buttons in the container were blue buttons. How many buttons were there altogether?

Answer: _____

Question**5**

Benjamin helped Mr Carter to sell some fruit. He sold 2 more apples than oranges. Each orange cost \$3 and each apple cost \$2. For every 10 fruit he sold, Mr Carter gave him \$1 from the sale. After giving Benjamin his money, Mr Carter collected a total of \$62 from the sale of his fruit. How many fruit of each type did Benjamin sell?

Answers: _____ oranges
_____ apples**Question****6**

There were 160 paperclips in 4 boxes, A, B, C and D. 12 paperclips were transferred from box A to box B. $\frac{1}{3}$ of the paperclips in box B were then transferred to box C and 17 paperclips from box D were also transferred to box C. Each of the boxes then had an equal number of paperclips. How many paperclips were there in each of the boxes at first?

Answers: Box A: _____
Box B: _____
Box C: _____
Box D: _____

Question**7**

Michael had 80% more money than Alvin. Vanessa had 40% less than Alvin. Michael and Alvin gave Vanessa some money in the ratio 3 : 2 respectively. In the end, Vanessa had twice as much money as before. Given that Michael had \$144 more than Vanessa in the end, how much money did each of them have at first?

Answers: Michael: _____

Alvin: _____

Vanessa: _____

Question**8**

Tom has some toy cars. $\frac{2}{5}$ of them are red. He has 35 more green cars than red cars. The remaining 15 toy cars are yellow. Tom decides to pack 5 toy cars of the same colour in a box. How many more boxes of red and green toy cars are there than boxes of yellow toy cars?

Answer: _____

Question**9**

David and Kristy had some cards. David had $\frac{3}{7}$ as many cards as Kristy. David gave away 9 cards and Kristy bought another 18 cards. In the end, the ratio of David's cards to Kristy's cards was 2 : 9. How many cards did they have altogether in the end?

Answer: _____

Question**10**

$\frac{2}{3}$ of the students in a class passed their English test. $\frac{9}{14}$ of those who passed their English test were girls. 4 more boys than girls did not pass the test. If there were 42 students in the class, how many girls were there in the class?

Answer: _____

Question**11**

Mrs Drew sold a total of 120 butter and chocolate chip cookies at a charity fair. Each butter cookie cost \$2 and each chocolate chip cookie cost \$4. She collected a total of \$310. How many more butter cookies than chocolate chip cookies did she sell?

Answer: _____

Question**12**

Jane and John had some marbles. After Jane gave John some marbles, he had three times as many marbles as he had at first. Jane then had half the number of marbles that John had. If they had a total of 180 marbles, how many marbles did each of them have at first?

Answers: John: _____

Jane: _____

Question**13**

$\frac{3}{5}$ of a number is greater than $\frac{1}{2}$ of the same number by 12. What is the difference between the number and its 4th multiple?

Answer: _____

Question**14**

Some students were divided into 3 groups. $\frac{1}{3}$ of the students from group 1 moved to group 2. 20% of the students in group 3 moved to group 2. Finally, 15 students moved from group 1 to group 3. There was now an equal number of students in each group. If there were 105 students, how many students were there in each group at first?

Answers: Group 1: _____

Group 2: _____

Group 3: _____

Question**15**

In 1998, Tom was four times as old as Jack. Peter was twice of Jack's age. If Tom was 36 years old in 1998,

(a) how old would Peter be in year 2000?

(b) What would their total age be in year 2003?

Answers: (a) _____

(b) _____

Question**16**

Thomas and Zack had some toy cars. They were then given an equal number of toy cars and Zack now had twice the number of toy cars as what he had at first. $\frac{2}{3}$ of Zack's toy cars were now $\frac{1}{2}$ of Thomas' toy cars. If Thomas had 36 more toy cars than Zack now,

- (a) how many toy cars were given to them altogether?
- (b) how many toy cars did Thomas have at first?

Answers: (a) _____

(b) _____

Question**17**

Joanne sold cookies, cakes and muffins at a fair in chocolate or butter flavour. She sold 140 more cookies than cakes at the fair. $\frac{1}{3}$ of the cookies and $\frac{2}{3}$ of the cakes that she sold were chocolate-flavoured. She sold an equal number of chocolate-flavoured cookies and cakes. She also sold an equal number of butter-flavoured cakes and muffins. The number of cakes sold was $\frac{3}{4}$ the number of muffins sold.

- (a) How many more butter-flavoured than chocolate-flavoured cookies, cakes and muffins were sold?
- (b) If each cookie cost 50¢, each cake cost \$1.50 and each muffin cost \$2, how much did Joanne collect altogether?

Answers: (a) _____

(b) _____

Question**18**

There were 4656 people at a concert. After $\frac{4}{5}$ of the men and $\frac{3}{4}$ of the women left the concert hall, there were 120 more women than men who remained behind. How many more women than men were there at first?

Answer: _____

Question**19**

$\frac{2}{3}$ of the oranges in a basket were overripe and the rest were ripe. When 40 oranges were taken out from the basket, the number of overripe oranges was $\frac{3}{4}$ of the total number of oranges in the basket. If there were 120 oranges in the basket at first,

- (a) how many overripe oranges were taken out from the basket?
- (b) how many ripe oranges were taken out from the basket?
- (c) how many more overripe than ripe oranges were left?

Answers: (a) _____

(b) _____

(c) _____



Learn the strategy 'Fill The Tail' (FTT).

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Question**20**

Mrs Crawford spent $\frac{1}{4}$ of her salary on her children's education and $\frac{2}{3}$ of the remainder on food every month. The rest of her money was saved and spent on transportation in the ratio 2 : 3. She spent \$265 more on her children's education than on transportation. If she earned and spent the same amount every month, how much did she spend on her children's education in half a year ?

Answer: _____

Question**21**

There were two tanks, tank A and tank B. Tank A measured 12 cm by 10 cm by 20 cm. It was $\frac{2}{3}$ filled with water. Half of the water was poured into tank B, which was already $\frac{1}{3}$ filled with water, filling it to the brim. What was the total capacity of the two tanks?
(Express your answer in litres.)

Answer: _____

Question**22**

Mrs Bowles bought some prawns and fish at a market. She bought 2.5 kg of fish and 1.5 kg more prawns than fish. She received \$5.50 in change from a \$50 note. If 1 kg of prawns cost \$3 more than 1 kg of fish, how much did she spend on prawns?

Answer: _____

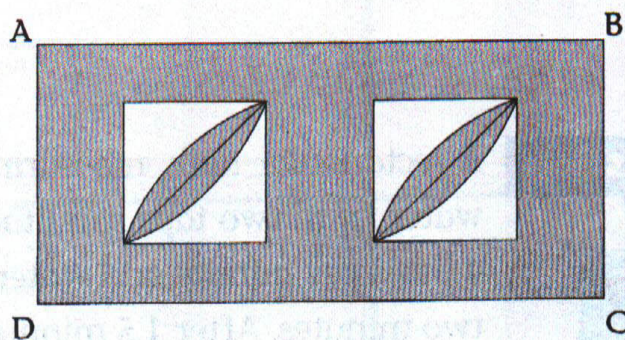
Question**23**

A container with base measuring 60 cm by 40 cm and a height of 25 cm was $\frac{4}{5}$ filled with water. Some of the water was removed, causing the water level to fall by 5 cm. The remaining water was then poured into a tank and a basin, filling them to their brims. The capacity of the basin was $\frac{1}{3}$ that of the tank. If the tank was 18 cm long and 15 cm wide, what was the height of the water in the tank?

Answer: _____

Question**24**

ABCD is a rectangle with a perimeter of 320 cm and a length of 96 cm. Two similar squares with sides 12 cm are placed in it. Find the area of the shaded parts of the figure. (Take $\pi = 3.14$)



Answer: _____

Question**25**

Joanne, Alice and Nick bought some pens and rulers. Joanne bought 3 pens and 2 rulers for \$10.80. Alice bought 5 pens and 4 rulers for \$19.20. Nick bought 2 rulers and some pens. He gave the cashier \$20 and received \$6.80 in change. How many pens did Nick buy?

Answer: _____

Question**26**

Frankie, Martin and Jeremy earned a total of \$120 by working at an exhibition. Jeremy earned half of what Frankie earned and Martin earned three times as much as Jeremy. Martin then gave Frankie $\frac{1}{4}$ of his money. Jeremy continued working for another few hours and earned four times the amount he had earned previously. How much more did Jeremy have than Frankie in the end?

Answer: _____

Question**27**

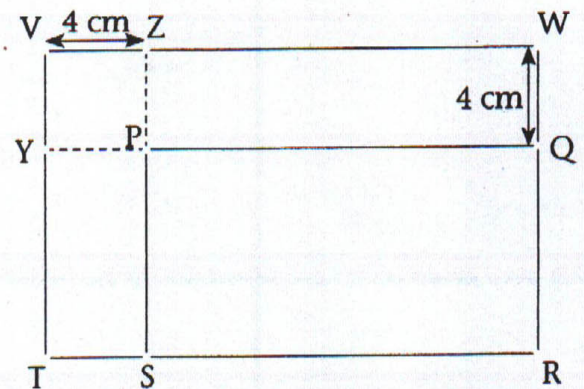
A rectangular tank, measuring 90 cm long and 10 cm wide, was filled with water from two taps simultaneously. Water from tap A flowed at a rate of 4 litres per minute and water from tap B flowed at a rate of 10 litres every two minutes. After 1.5 minutes, only $\frac{1}{4}$ of the tank was filled. What was the height of the tank?

Answer: _____

Question

28

PQRS is a rectangle. When the length and breadth of the rectangle increase, the rectangle is enlarged to VWRT and the area of the rectangle is increased by 226 cm^2 . If the length of rectangle PQRS is twice its breadth, find the perimeter of rectangle PQRS.



Answer: _____

Question

29

There are two tanks, A and B. 30% of tank A is filled with water. $\frac{2}{5}$ of the water in tank A is then poured into the empty tank B, filling half of it. If tank B measures 15 cm by 12 cm by 25 cm, how much water is needed now to fill tank A completely?

Answer: _____

Question**30**

Patrick, Jemima and Angela had \$482 altogether. Angela had $\frac{3}{8}$ of what Jemima had. After Patrick used \$125, he had $\frac{1}{4}$ less than what Jemima had. Find the total sum of money that Patrick and Angela had at first.

Answer: _____

Question**31**

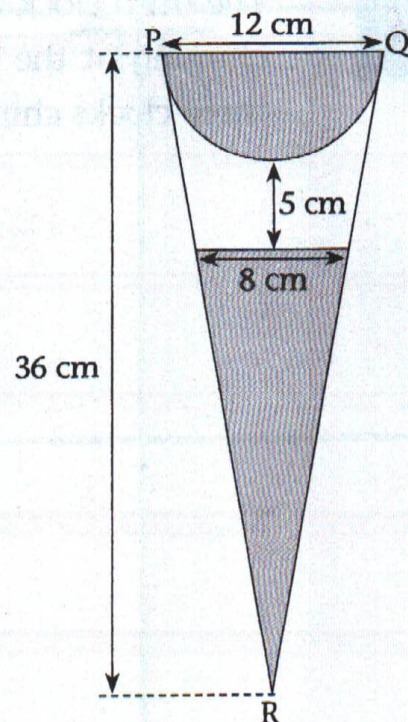
Margaret had some red and yellow beads in the ratio 10 : 9. When she used 30 yellow beads, the ratio of red beads to yellow beads was 5 : 2. If each red bead cost 90¢ and each yellow bead cost 20¢ more, how much did Margaret pay for the total number of beads she had at first?

Answer: _____

Question**32**

The figure (not drawn to scale) shows a semicircle and a small triangle inside triangle PQR. PQ is the diameter of the semicircle. Find the area of the unshaded portion.

(Take $\pi = 3.14$)



Answer: _____

Question**33**

A tank measuring 70 cm by 45 cm by 50 cm is filled with water from two taps. Water from each tap flows at a rate of 7 litres per minute. After 10 minutes, the taps are turned off and 30% of the water in the tank is poured into an empty tub. The tub is now $\frac{3}{4}$ full. How much more water is needed to fill the tub and the tank completely?

Answer: _____

Question**34**

There are three clocks in Dominic's house. The first clock chimes every three minutes and the second clock chimes one minute after the first clock chimes. The third clock chimes every six minutes. If Dominic hears the three clocks chiming at the same time at 10.45 am, how many more times would the three clocks chime together again in the next one hour?

Answer: _____

Question**35**

Frederick and Justina were each given a sum of money by their parents. If Frederick and Justina spent \$8 and \$16 respectively each day, Justina would still have \$70. If Frederick and Justina spent \$16 and \$8 respectively each day instead, Justina would have \$430 left. How much money did each of them receive from their parents?

Answer: _____

Question**36**

There is some water in two tanks, tank A and tank B. The ratio of the volume of water in tank A to tank B is 4 : 3. 0.8 litres of water is added and fills tank A completely. There is now twice as much water in tank A than in tank B. The total volume of tank A is $\frac{1}{4}$ the total volume of tank B when it is completely filled to the brim. How much more water is needed to fill tank B to its brim?

Answer: _____

Question**37**

Gilbert and Germaine shared a sum of money. After Germaine spent \$70, she had twice as much money as Gilbert. Gilbert then received some money and he now had three times the amount of money Germaine had at first. If Gilbert received \$300, what was the total amount of money both of them had in the end?

Answer: _____

Question

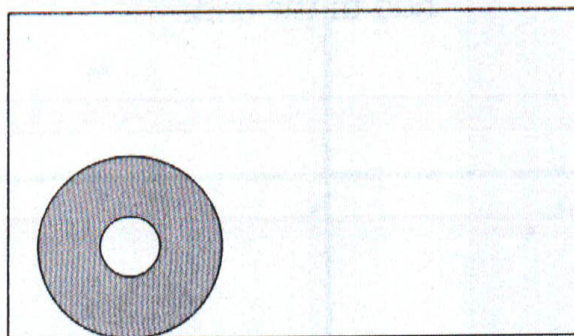
3 books and 2 magazines cost \$84. 3 comics and 2 magazines cost \$54. The total cost of 2 comics and 2 books is \$52. What is the cost of 1 magazine?

38

Answer: _____

Question

Two circles which share the same centre are drawn in a rectangle. The radius of the smaller circle is 7 cm and the radius of the larger circle is 21 cm. The ratio of the shaded portion of the figure to the unshaded portion of the figure is 2 : 7. Find the area of the unshaded portion of the figure. (Take $\pi = \frac{22}{7}$)

39

Answer: _____

Question**40**

A container measures 12 cm by 15 cm by 30 cm. Some water is poured into it until it is two-thirds full. More water is then poured from a tub into the container until the container is full. The remaining water in the tub is only 20% of its original volume. If the base of the tub measures 24 cm by 15 cm, what was the water level in the tub at first?

Answer: _____

Question**41**

There are 6 similar rectangles in figure A. These rectangles are then rearranged to form figure B. If the area of figure A is 864 cm^2 , what is the perimeter of figure B?

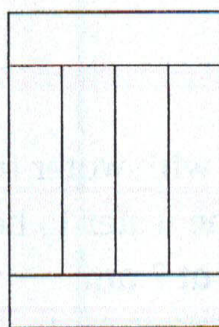


Figure A

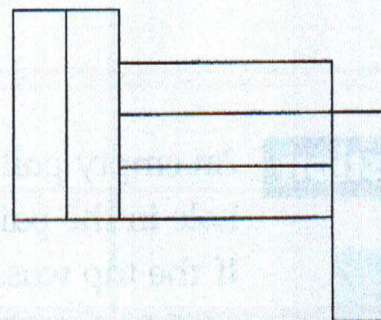


Figure B

Answer: _____

Question**42**

A fruiterer sold 30% more apples than oranges and 10% more pears than oranges. He sold 104 apples. If apples were sold in bags of 4 for \$6, pears were sold in bags of 8 for \$10 and oranges were sold in bags of 2 for \$3, how much did the fruiterer collect?

Answer: _____

Question**43**

4 oranges, 3 apples and 2 papayas cost \$15.50. 2 oranges and 6 papayas cost \$28.60. 3 oranges and 4 apples cost \$6.80. How much does each type of fruit cost?

Answers: Apple: _____

Orange: _____

Papaya: _____

Question**44**

An empty pail was filled with water from a tap at a rate of 3 l per minute. A hole in the pail caused the water to be drained at a rate of 0.5 l per minute. If the tap was turned on at 7 am,

(a) how much water would there be in the pail at 9.30 am?

(b) how long would it take to fill the pail with 10 l of water?

Answers: (a) _____

(b) _____

Question**45**

All the orange juice in a carton was poured into three containers, A, B and C. 20 ml was poured from B to C and 210 ml was then poured from C to A. 150 ml of orange was then poured out from A. As a result, the amount of orange juice in A in the end was three times the amount it had at first. B and C had the same amount of orange juice left. This was three times the amount A had in the end.

- (a) How much orange juice was in each container at first?
 (b) How much orange juice was in the carton at first?

Answers: (a) Container A: _____

Container B: _____

Container C: _____

(b) _____

Question**46**

Joanne and Alex had some money. Joanne gave $\frac{1}{4}$ of her money to her mother. She then saved and spent the rest of her money in the ratio 1 : 2. Alex spent $\frac{1}{6}$ of his money on clothes and $\frac{1}{3}$ of his money on books. He then saved the rest. The amount that Joanne gave her mother was equal to the amount that Alex spent on books. If Joanne then gave Alex \$180 from her savings, she would only have $\frac{1}{4}$ of Alex's savings.

- (a) How much did each of them have at first?
 (b) How much did they spend altogether?

Answers: (a) Joanne: _____

Alex: _____

(b) _____

Question**47**

A tank was being filled with water from two taps simultaneously at a rate of 6 litres a minute from each tap. At the same time, the water was being drained out from a hole at the bottom of the tank at a rate of 8 litres every four minutes. If the tank was only 40% filled with water after 10 minutes,

- (a) what was the capacity of the tank?
- (b) how long more before the tank is completely filled with water?

Answers: (a) _____

(b) _____

Question**48**

Mary had \$50 and Tom had \$130. Their mother gave each of them an equal amount of money every day and after two days, Mary had $\frac{2}{3}$ as much money as Tom.

- (a) How much money did their mother give them altogether in the two days?
- (b) How much did their mother give to Mary each day?

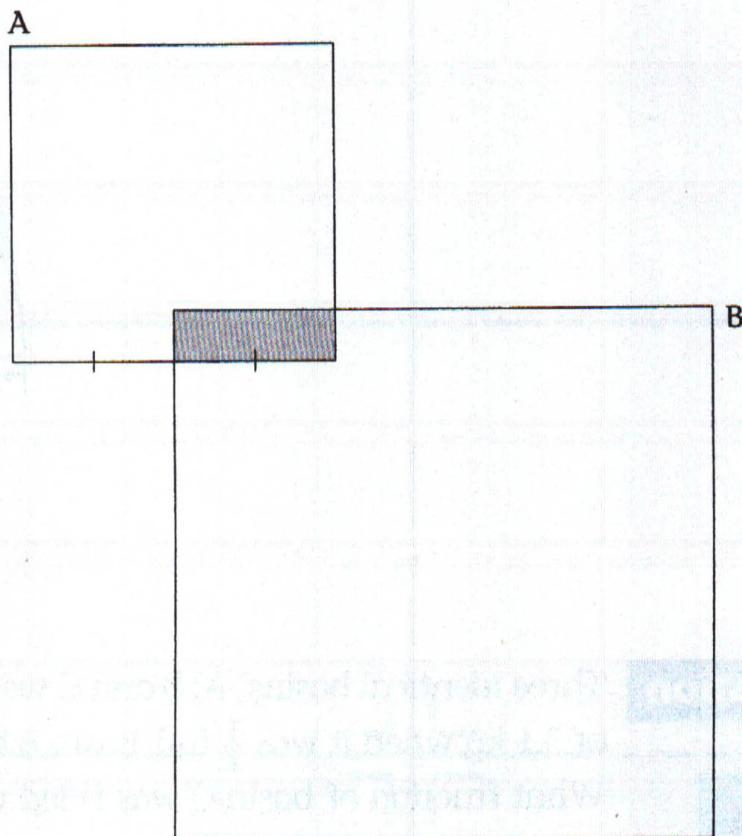
Answers: (a) _____

(b) _____

Question**49**

The ratio of the perimeter of square A to square B is 3 : 5. The ratio of the perimeter of the shaded rectangle to the perimeter of square A is 2 : 6. If the total perimeter of squares A and B is 192 cm,

- (a) what is the area of the shaded rectangle?
- (b) what is the area of the unshaded portion of square B?
- (c) what is the total area of the unshaded portions of square A and square B?



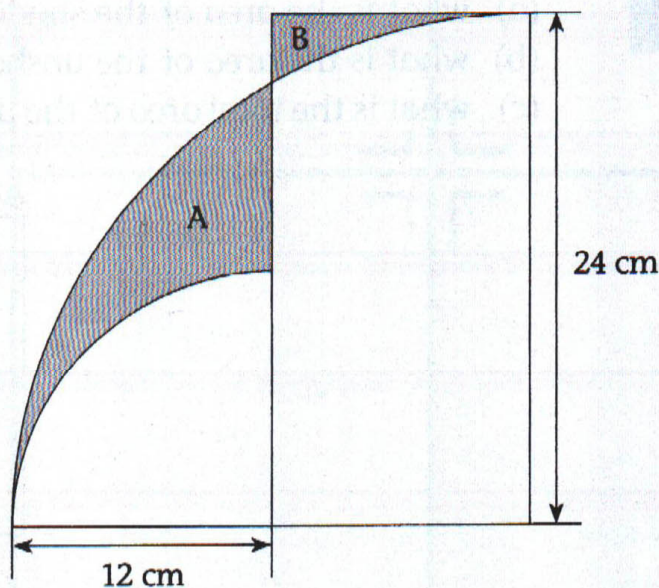
Answers: (a) _____

(b) _____

(c) _____

Question**50**

The figure below shows a rectangle and 2 quadrants. The radii of the 2 quadrants are 12 cm and 24 cm. Find the difference in area between the shaded portions, A and B. (Take $\pi = 3.14$)



Answer: _____

Question**51**

Three identical basins, A, B and C were filled with water. Basin A had a mass of 3.1 kg when it was $\frac{1}{2}$ full. Basin B had a mass of 2.2 kg when it was $\frac{1}{5}$ full. What fraction of basin C was filled with water if it had a mass of 2.8 kg?

Answer: _____

Question**52**

A tank measuring 20 cm by 12 cm by 15 cm was filled with some water. When $\frac{1}{10}$ of the water in the tank was poured into a tub, the volume of water in the tub increased by 12 cm^3 . What fraction of the tank was not filled with water at first?

Answer: _____

Question**53**

Mathew had some pens. On the first day, he sold $\frac{1}{4}$ of them. On the second day, he sold $\frac{1}{3}$ more than the number of pens sold on the first day. He sold the remaining pens on the third day. If he sold 15 more pens on the second day than on the third day, how many pens did he have at first?

Answer: _____

Question**54**

Edmund bought some packs of cookies. A small pack of cookies cost \$4, a medium-sized pack of cookies cost \$6 and a large pack of cookies cost \$8. $\frac{1}{3}$ of the packs that Edmund bought were small. He bought $\frac{1}{5}$ more medium-sized packs than small packs. The remaining packs were large. If Edmund spent \$180 altogether, how many packs of each type did he buy?

Answers: Small: _____

Medium: _____

Large: _____

Question**55**

Ben and Tom had a total of 144 sweets. Ben gave Tom $\frac{1}{3}$ of what he had. Tom then gave $\frac{1}{4}$ of what he had to Ben. If both of them had an equal number of sweets in the end, how many sweets did each of them have at first?

Answers: Ben: _____

Tom: _____

Question**56**

Claudia and Agnes had some curry puffs. Claudia gave Agnes $\frac{1}{4}$ of the number of curry puffs that she had. Agnes gave Claudia $\frac{1}{11}$ of the number of curry puffs that she had. Both of them then had the same number of curry puffs. If there were 240 curry puffs altogether, how many curry puffs did each girl have at first?

Answers: Claudia: _____

Agnes: _____

Question**57**

A florist sold $\frac{1}{3}$ of the orchids and $\frac{1}{3}$ of the roses yesterday. She had 60 orchids and roses left. She then sold another 14 roses and had $\frac{1}{5}$ the original number of roses left. How many orchids and roses did she have at first?

Answer: _____

Question**58**

There are some Chinese, English and Malay books on a shelf. $\frac{1}{4}$ of the books are Chinese books. $\frac{1}{5}$ of the remaining are English books. There are 63 more Malay books than English books. How many books of each type are there?

Answers: Chinese: _____

English: _____

Malay: _____

Question**59**

Sandy had some apples and pears. After selling $\frac{1}{3}$ of the apples and 7 pears, the number of pears left was a quarter of the number of apples left. If the number of pears sold was $\frac{1}{6}$ the number of pears that were not sold, how many fruit of each type did Sandy have at first?

Answers: Apples: _____

Pears: _____

Question**60**

Mr Jones has some notes. $\frac{1}{5}$ of them are two-dollar notes. $\frac{3}{8}$ of the rest are ten-dollar notes. The remaining notes are five-dollar notes. The total sum of money he has is \$295. How many ten-dollar notes does he have?

Answer: _____

Question**61**

Jim and Alice shared some marbles. $\frac{1}{2}$ of Jim's marbles were $\frac{2}{3}$ of Alice's marbles. He gave 30 marbles to Alice and Alice now had 40 marbles more than Jim. Jim had $\frac{5}{8}$ of his marbles left. How many marbles did each of them have at first?

Answers: Jim: _____

Alice: _____

Question**62**

Francis had a total of \$3.60 in five-cent and twenty-cent coins. $\frac{2}{3}$ of his coins were twenty-cent coins. How many coins of each type did he have?

Answers: twenty-cent coins: _____

five-cent coins: _____

Question**63**

Three cars P, Q and R were travelling at uniform speed. Cars P and R started from the same location, Point A, and were travelling towards car Q. Car Q was heading towards Point A. The three cars were 300 km apart at 8.30 am. Car Q passed car P at 11.30 am. Car Q then passed car R half an hour later. If the speed of car P was 60 km/h, how much further did car Q travel from the meeting with car P before meeting with car R?

Answer: _____

Question**64**

At noon, Terence and Linda drove from town A to town B. Terence's average speed for the whole journey was 15 km/h faster than Linda's. When Terence reached town B at 4 pm, Linda had only covered 224 km. What was the distance between town A and town B?

Answer: _____

Question**65**

Aaron travelled from his home to Town P. He left his home at 5.30 am, travelling at a uniform speed of 80 km/h. He arrived at Town P at 11.30 am, which was 1 hour and 36 minutes later than the expected arrival time. If he had travelled at 100 km/h for half of his journey, what should his speed be for the second half of his journey in order to be on time?

Answer: _____

Question**66**

Jasper left point A at 8.30 am and drove to point B at a uniform speed of 90 km/h. Tony left point A 2 hours earlier than Jasper and reached point B at 10.30 am. He travelled 10 km/h slower than Jasper. How far was Jasper from point B when Tony reached point B?

Answer: _____

Question**67**

George started jogging at 4.15 pm and jogged along a path at a speed of 9 km/h. At 4.45 pm, Caleb began jogging along the same path. At 5.45 pm, Caleb had already run 2 km further than George. If Caleb jogged at a constant speed, what would be the distance that Caleb covered if he started jogging at the same time as George?

Answer: _____

Question**68**

A car took 5 hours to travel from town A to town B. A bus took 9 hours to travel the same route. Both the car and the bus started at the same time. If the speed of the car was 90 km/h, how much faster did the bus need to travel in order to reach town B 1 hour and 36 minutes earlier than the expected arrival time, if it could only increase its speed after $\frac{3}{5}$ of the journey?

Answer: _____

Question**69**

Aaron, Bryan and Collin were waiting to start a race. Collin was 150 m ahead of Bryan and Aaron was 50 m behind Bryan. At 8 am, they started the race. Aaron overtook Bryan in 2 minutes. In another 3 minutes Aaron overtook Collin. If Bryan's speed was 120 m/min, at what time did Bryan overtake Collin? (Assume that the 3 boys ran at constant speed throughout the race.)

Answer: _____

Question**70**

Sean drove at a uniform speed of 90 km/h. He started driving at 5.30 am and reached his destination at 1.30 pm. Mary started driving at the same time as Sean and reached the same destination in 6 hours. How far was Sean from his destination when he was 150 km apart from Mary?

Answer: _____

Question**71**

Mark left town P for town Q at 10 am, travelling at a uniform speed of 75 km/h. Jane left town P for town Q an hour after Mark, travelling at 120 km/h. She passed Mark after travelling $\frac{2}{5}$ of the journey. She reached town Q at 4 pm.

- (a) How far was Jane from town Q when she passed Mark?
- (b) How fast should Mark travel after meeting Jane if he wanted to reach town Q at 3.30 pm? (*Assume that Jane travelled at uniform speed throughout the whole journey.)

Answers: (a) _____

(b) _____

Question**72**

A container measured 15 cm by 20 cm by 30 cm. It was already $\frac{1}{3}$ filled with water. It was then filled with more water from 2 taps simultaneously. Water flowed from the first tap at a rate of 120 ml/min and from the second tap at a rate of 180 ml/min. How much faster would it take to fill the container completely if the water flowed from each tap at a rate of 200 ml/min?

Answer: _____

Question**73**

A car began travelling from point P to point Q at 9 am. It travelled at a uniform speed of 90 km/h and reached point Q at 1 pm. A lorry began travelling from point Q to point P an hour after the car had started its journey. After travelling for $\frac{1}{4}$ of the distance, the lorry met the car.

- (a) What was the distance travelled by the car when it passed the lorry?
- (b) What was the total time taken by the lorry to travel from point Q to point P?

Answers: (a) _____

(b) _____

Question**74**

Jack drove at 80 km/h for the first $\frac{5}{9}$ of his journey. He then completed the remaining 24 km of his journey in 12 minutes.

- (a) How long did he take to complete the whole journey?
- (b) What was his speed for the second part of his journey?

Answers: (a) _____

(b) _____

Question**75**

Tom drove from point A to point B at 5.45 am. Jane began the same journey two hours later, travelling at a uniform speed of 100 km/h. Jane overtook Tom after completing $\frac{3}{5}$ of her journey and reached point B four hours later.

- (a) How far was Tom from point B when Jane overtook him?
- (b) What was Tom's average speed?
- (c) At what time would Tom reach point B?

Answers: (a) _____

(b) _____

(c) _____

Question**76**

Motorist A left town P for town Q at 9.30 am, travelling at a speed of 80 km/h. He arrived at town Q at 3.30 pm. Motorist B left town P for town Q two hours after motorist A, travelling at a speed of 100 km/h.

- (a) What time did motorist B arrive at town Q?
- (b) How fast would motorist B have to travel if he wanted to reach town Q at the same time as motorist A?

Answers: (a) _____

(b) _____

Question**77**

Train A travelled from town X to town Z at 160 km/h. Train B took 6 hours to travel the same distance. Both the trains passed town Y at 2 pm and train B arrived at town Z at 4 pm. If town Y was 400 km away from town Z,

- (a) what time did train A leave town X?
- (b) what time did train A reach town Z?

Answers: (a) _____

(b) _____



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Question**78**

A large warehouse had a total of 4000 towels for sale. The ratio of the number of blue towels to red towels was 2 : 1. The rest were white towels. After $\frac{1}{4}$ of the blue towels and $\frac{1}{2}$ of the white towels were sold, there were 2400 towels left. How many red and white towels were there at first?

Answer: _____

Question**79**

Paul puts some beads in 3 jars, A, B and C. The ratio of the number of beads in jar A to jar B is 2 : 3. The ratio of the number of beads in jar B to jar C is 2 : 1. If Paul transfers an equal number of beads from jar B to jars A and C, he will have an equal number of beads in jars A and B and the total number of beads in jar C will increase to 297. Find the total number of beads in the three jars.

Answer: _____

Question**80**

$\frac{1}{3}$ of the people at a party are men. When half of the number of men leave the party, there are 96 more women than men. If 8 women leave the party, find the ratio of the number of men to the number of women who remain at the party.

Answer: _____

Question**81**

Cindy and Mark had a total of 80 marbles in the ratio 3 : 2. After giving away some of her marbles, Cindy had $\frac{1}{4}$ as many marbles as Mark. How many marbles did Cindy give away?

Answer: _____

Question**82**

In a country club, the ratio of the number of men to women was $2 : 3$. $\frac{1}{4}$ of the men and $\frac{1}{2}$ of the women left the club. The number of people who remained in the club was 24 more than the number of people who left. How many people were in the club at first?

Answer: _____

Question**83**

Mandy and Jack had some sweets in the ratio $5 : 7$. After Mandy gave Jack some sweets, the ratio of the number of sweets that Mandy had to the number of sweets Jack had was $3 : 21$. If Jack had 168 sweets at first, how many sweets should Jack return to Mandy so that both of them would then have an equal number of sweets?

Answer: _____

Question**84**

Some sweets were placed in 3 containers, A, B and C. The ratio of the sweets in A to B was 7 : 4 and the ratio of the sweets in B to C was 3 : 2. After 36 sweets were taken from A, the number of sweets in C was $\frac{2}{3}$ the number of sweets in A. What was the total number of sweets left in the three containers?

Answer: _____

Question**85**

There are 1580 adults and children on a ship. 60% of them are adults. When the ship stops at the harbour, some of the adults alight and the percentage of adults remaining on the ship decreases to 20%.

- (a) How many adults alight from the ship?
- (b) What is the ratio of children to adults who remain on the ship?

Answers: (a) _____

(b) _____

Question**86**

Mrs Gibbs sold some chocolate cakes and Mrs Drew sold some strawberry cakes. Each chocolate cake cost \$4 and each strawberry cake cost \$3 more than 2 chocolate cakes. The number of cakes that Mrs Gibbs and Mrs Drew sold was in the ratio 5 : 3. If Mrs Gibbs sold 8 more cakes than Mrs Drew, how much money did they collect altogether from the sales of the cakes?

Answer: _____

Question**87**

Susan, Mark and Jane sold some charity tickets which cost \$1.20 each. Susan sold half of the charity tickets. Mark and Jane sold the rest of the charity tickets in the ratio 5 : 3. If Mark sold 18 more charity tickets than Jane, how much money did they collect in all?

Answer: _____

Question**88**

A sum of money was shared between Alvin, Zachary and Philip in the ratio $2 : 5 : 3$ respectively. After Zachary spent 20% of his money, the amount he had left was \$196 less than the total amount of money that Alvin and Philip had. How much more money did Alvin and Zachary had than Philip at first?

Answer: _____

Question**89**

40% of the adults left the party before it ended. 10% of those who left were men. The ratio of the number of men who left the party to the men who remained behind was $2 : 5$. If there were 105 men at the party at first, how many women were at the party at first?

Answer: _____

Question**90**

Kate, Melissa, Ann and Jack shared a jar of biscuits. Kate took 30% of the biscuits and Melissa took 25% of the biscuits. Jack took the remaining 80 biscuits. Ann took 20 more biscuits than Melissa. What percentage of the biscuits did Ann take from the jar?

Answer: _____

Question**91**

Uncle Sam sells cups at a shop. For every cup that he sells, he collects 20% of the price of the cup. For every 10 cups that he sells, he earns an extra 5% of the price of a cup. A cup is sold for \$8. If he collects \$86.80, how many cups does he sell?

Answer: _____

Question**92**

In a class, 20% of the students are boys. 20% of the boys and 10% of the girls keep pets. If 144 of the girls do not keep pets, how many children keep pets?

Answer: _____

Question**93**

Samuel had some marbles. $\frac{2}{5}$ of them were red. Of the remaining marbles, 10% of them were blue and 10% were green. The rest of the marbles were yellow. If there were 32 more yellow marbles than red marbles, find the total number of blue and green marbles.

Answer: _____

Question**94**

Jane and Jeffrey had some marbles. Jane had 40% more marbles than Jeffrey. When Jane lost 12 marbles and gave 16 marbles to Jeffrey, both of them had an equal number of marbles. How many marbles did each of them have at first?

Answers: Jane: _____

Jeffrey: _____

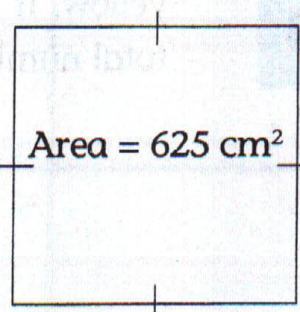
Question**95**

Mrs Wood received a fixed monthly salary. She saved 10% of her salary in the first month. The following month, she saved 50% more than what she did in the first month. She saved \$496.50 more on the second month than the first month. What was her total salary for half a year?

Answer: _____

Question**96**

The figure below is a square with an area of 625 cm^2 . Find the percentage increase in area if the length of each side is increased by 40%.



Answer: _____

Question**97**

80% of the books in a box are second-hand books and the rest are new books. 10% of the new books and 60% of the second-hand books are English books and the rest are Chinese books. After another 15 English books are placed in the box, the ratio of English books to Chinese books is 3 : 2.

- (a) How many English books are there in the box at first?
- (b) What is the total number of books in the box in the end?

Answers: (a) _____

(b) _____

Question**98**

In January, Joyce kept 80% of her salary of which she then gave $\frac{1}{5}$ to her mother and saved the rest. The rest of her money was spent on food and clothing. In February, she gave her mother \$150 more than the amount she had given her in January. The amount given to her mother was then equal to the amount she saved. She spent the same amount on food and clothing in January and February.

- (a) What was the percentage increase in the amount Joyce gave to her mother in February?
- (b) How much did Joyce spend on food and clothing in each month?

Answers: (a) _____

(b) _____

Question**99**

There were 4500 seats in a theatre. 10% of the seats were first-class, 30% were second-class seats and the rest were third-class seats. Another 200 first-class and 250 second-class seats were added to the theatre.

- (a) How many first-class seats were there in the end?
 - (b) How many second-class seats were there in the end?
 - (c) What percentage of the seats were third-class in the end?
- (Leave your answer in fraction.)

Answers: (a) _____

(b) _____

(c) _____

Question**100**

Jeremy and Alicia had a total of \$360. Jeremy had \$24 more than Alicia. Alicia spent 3 times as much money as Jeremy and was left with 50% of the amount of money Jeremy had left.

- (a) How much did Jeremy have at first?
- (b) How much had Jeremy left?

Answers: (a) _____

(b) _____

Question**101**

There were 207 pears and 176 mangoes in crate A. There were 293 pears and 274 mangoes in crate B. Robert moved some pears and mangoes from crate B to crate A. In the end, 40% of the fruit in crate A and 70% of the fruit in crate B were pears. How many pieces of fruit did Robert move from crate B to crate A?

Answer: _____



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Solution to Question

1

Use a 'Guess and Check' table to find out how many questions were answered correctly

*Start the deductions by having half the number of questions answered correctly.

| Correct Answers | Correct Points | Wrong Answers | Deducted Points | Total Points | Check |
|-----------------|--------------------|---------------|------------------|---------------|-------|
| 7 | $7 \times 3 = 21$ | 8 | $8 \times 1 = 8$ | $21 - 8 = 13$ | × |
| 9 | $9 \times 3 = 27$ | 6 | $6 \times 1 = 6$ | $27 - 6 = 21$ | × |
| 11 | $11 \times 3 = 33$ | 4 | $4 \times 1 = 4$ | $33 - 4 = 29$ | ✓ |

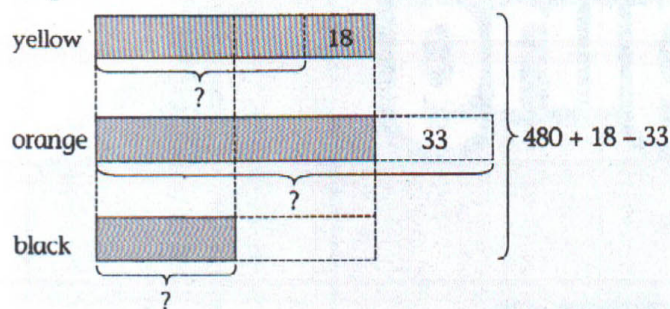
Peter answered 11 questions correctly.

Answer: 11 questions

Solution to Question

2

Step 1 : Draw a model



Step 2 : Find the number of beads after 18 yellow beads were added and 33 orange beads were taken out
 $480 + 18 - 33 = 465$

Step 3 : Find the number of black beads at first
 5 units $\rightarrow 465$
 1 unit $\rightarrow 465 \div 5 = 93$

Step 4 : Find the number of orange beads at first
 2 units $\rightarrow 2 \times 93 = 186$
 $186 + 33 = 219$

Step 5 : Find the number of yellow beads at first
 $186 - 18 = 168$

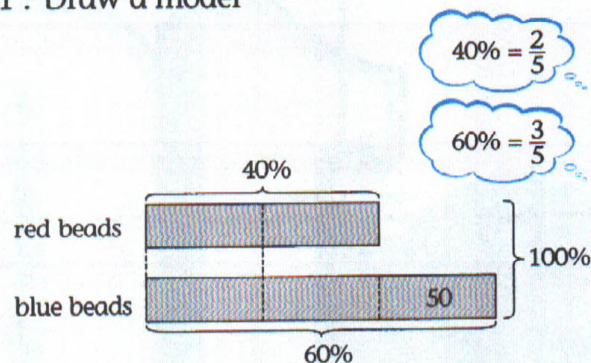
There were 168 yellow beads, 219 orange beads and 93 black beads at first.

Answers: 168 yellow beads
219 orange beads
93 black beads

Solution to Question

3

Step 1 : Draw a model



Step 2 : Find the total number of blue beads at first

1 unit (20%) $\rightarrow 50$
 3 units (60%) $\rightarrow 3 \times 50$
 $= 150$

Step 3 : Find the total number of red and blue beads

5 units (100%) $\rightarrow 5 \times 50$
 $= 250$

Step 4 : Find the number of beads Angie had in the end

$250 - 50 = 200$

Angie had 200 beads in the end.

Answer: 200 beads

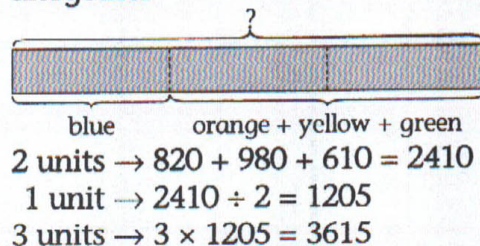
Solution to Question

4

Step 1 : Find the number of orange, yellow and green buttons

Orange buttons : 820
 Yellow buttons : $820 + 160 = 980$
 Green buttons : $820 - 210 = 610$

Step 2 : Find the total number of buttons altogether



There were 3615 buttons altogether.

Answer: 3615 buttons

Solution to Question

5

Step 1 : Use 'Guess and Check' table to find the number of fruit of each type Benjamin sold

Thinking skills :
Spatial Visualisation

| Fruit | Quantity | Amount | Collected by Mr Carter | Check |
|--------|----------|------------------------|----------------------------|-------|
| orange | 18 | $18 \times \$3 = \54 | $\$54 + \$40 - \$3 = \91 | x |
| apple | 20 | $20 \times \$2 = \40 | | |
| total | 38 | given \$3 | | |
| orange | 13 | $13 \times \$3 = \39 | $\$39 + \$30 - \$2 = \67 | x |
| apple | 15 | $15 \times \$2 = \30 | | |
| total | 28 | given \$2 | | |
| orange | 12 | $12 \times \$3 = \36 | $\$36 + \$28 - \$2 = \62 | ✓ |
| apple | 14 | $14 \times \$2 = \28 | | |
| total | 26 | given \$2 | | |

Benjamin sold 12 oranges and 14 apples.

Answers: 12 oranges
14 apples

Solution to Question

6

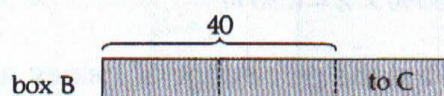
Step 1 : Find the number of paperclips in each box in the end

$$160 \div 4 = 40$$

Step 2 : Find the number of paperclips in box D at first

$$40 + 17 = 57$$

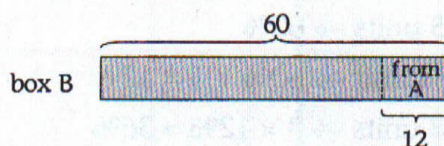
Step 3 : Find the number of paperclips in box B at first



$$2 \text{ units} \rightarrow 40$$

$$1 \text{ unit} \rightarrow 40 \div 2 = 20$$

$$3 \text{ units} \rightarrow 3 \times 20 = 60$$

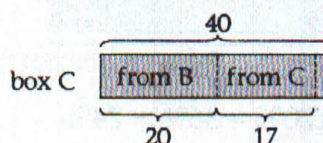


$$60 - 12 = 48$$

Step 4 : Find the number of paperclips in box A at first

$$40 + 12 = 52$$

Step 5 : Find the number of paperclips in box C at first



$$40 - 17 - 20 = 3$$

There were 52 paperclips in box A, 48 paperclips in box B, 3 paperclips in box C and 57 paperclips in box D.

Answers: Box A: 52 paperclips

Box B: 48 paperclips

Box C: 3 paperclips

Box D: 57 paperclips

Step 1 : Find the percentage of money each of them had at first

Michael \rightarrow 180%

Alvin \rightarrow 100%

Vanessa \rightarrow 60%

Step 2 : Find the percentage of money Vanessa had after receiving some money from Alvin and Michael

$$60\% \times 2 = 120\%$$

Step 3 : Find the percentage of money given to Vanessa

M : A

3 : 2
5 units

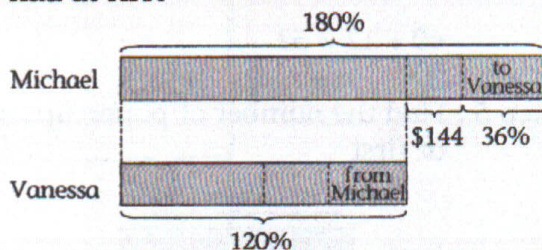
5 units \rightarrow 60%

1 unit $\rightarrow 60\% \div 5 = 12\%$

3 units $\rightarrow 3 \times 12\% = 36\%$

2 units $\rightarrow 2 \times 12\% = 24\%$

Step 4 : Find the amount of money each of them had at first



$$180\% - 120\% - 36\% = 24\%$$

$$24\% \rightarrow \$144$$

$$1\% \rightarrow \$144 \div 24 = \$6$$

$$\text{Michael: } 180\% \rightarrow 180 \times \$6 = \$1080$$

$$\text{Alvin: } 100\% \rightarrow 100 \times \$6 = \$600$$

$$\text{Vanessa: } 60\% \rightarrow 60 \times \$6 = \$360$$

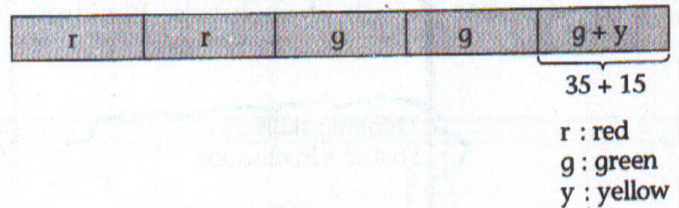
Michael had \$1080, Alvin had \$600 and Vanessa had \$360.

Answers: Michael: \$1080

Alvin: \$600

Vanessa: \$360

Step 1 : Draw a model



Step 2 : Find the total number of red and green cars Tom had

$$1 \text{ unit} \rightarrow 35 + 15 = 50$$

$$4 \text{ units} \rightarrow 4 \times 50 = 200$$

$$200 + 35 = 235$$

Step 3 : Find the number of boxes needed for the red and green cars and yellow cars

$$\text{Red and green cars} \rightarrow 235 \div 5 = 47$$

$$\text{Yellow cars} \rightarrow 15 \div 5 = 3$$

Step 4 : Find the difference in the number of boxes

$$47 - 3 = 44$$

There are 44 more boxes of red and green toy cars than yellow toy cars.

Solution to Question

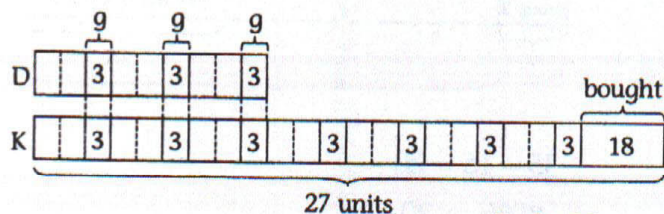
9

Step 1 : Draw a model

$$\frac{3}{7} = \frac{6}{14}$$

David : Kristy

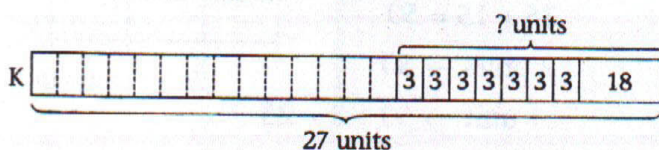
$$\begin{array}{c} 2 : 9 \\ \times 3 \quad \times 3 \\ \hline 6 : 27 \\ \hline 33 \text{ units} \end{array}$$



D : David
K : Kristy
g : given away

Step 2 : Find the number of cards they had altogether in the end

Rearrange Kristy's bar model



$$27 \text{ units} - 14 \text{ units} = 13 \text{ units}$$

$$3 \times 7 = 21$$

$$21 + 18 = 39$$

$$13 \text{ units} \rightarrow 39$$

$$1 \text{ unit} \rightarrow 39 \div 13 = 3$$

$$33 \text{ units} \rightarrow 33 \times 3 = 99$$

They had 99 cards altogether in the end.

Answer: 99 cards

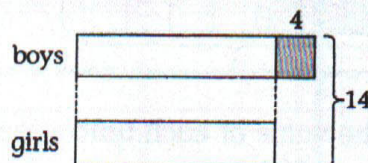
Solution to Question

10

Step 1 : Find the number of students who did not pass the test

$$1 - \frac{2}{3} = \frac{1}{3} \quad \frac{1}{3} \times 42 = 14$$

Step 2 : Draw a model



Step 3 : Find the number of girls who failed the test

$$14 - 4 = 10 \quad 10 \div 2 = 5$$

Step 4 : Find the number of students who passed the test

$$\frac{2}{3} \times 42 = 28$$

Step 5 : Find the number of girls who passed the test

$$\frac{9}{14} \times 28 = 18$$

Step 6 : Find the number of girls in the class

$$18 + 5 = 23$$

There were 23 girls in the class.

Answer: 23 girls

Solution to Question

11

Step 1 : Use 'Guess and Check' table to find the number of butter cookies and chocolate cookies Mrs Drew sold

| Butter cookies | Chocolate chip cookies | Total amount | Check |
|----------------|------------------------|---|-------|
| 70 | 50 | $(70 \times \$2) + (50 \times \$4) = \$340$ | × |
| 80 | 40 | $(80 \times \$2) + (40 \times \$4) = \$320$ | × |
| 86 | 34 | $(86 \times \$2) + (34 \times \$4) = \$308$ | × |
| 85 | 35 | $(85 \times \$2) + (35 \times \$4) = \$310$ | ✓ |

Step 2 : Find how many more butter cookies she sold

$$85 - 35 = 50$$

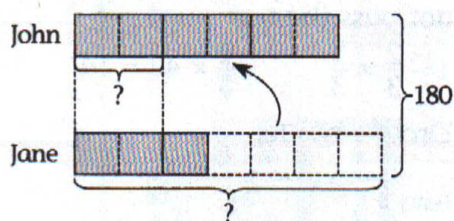
She sold 50 more butter cookies.

Answer: 50 more butter cookies

Solution to Question

12

Step 1 : Draw a model



Step 2 : Find the value of each unit

$$9 \text{ units} \rightarrow 180$$

$$1 \text{ unit} \rightarrow 180 \div 9 = 20$$

Step 3 : Find the number of marbles each of them had at first

$$\text{John: } 2 \text{ units} \rightarrow 2 \times 20 = 40$$

$$\text{Jane: } 7 \text{ units} \rightarrow 7 \times 20 = 140$$

John had 40 marbles and Jane had 140 marbles at first.

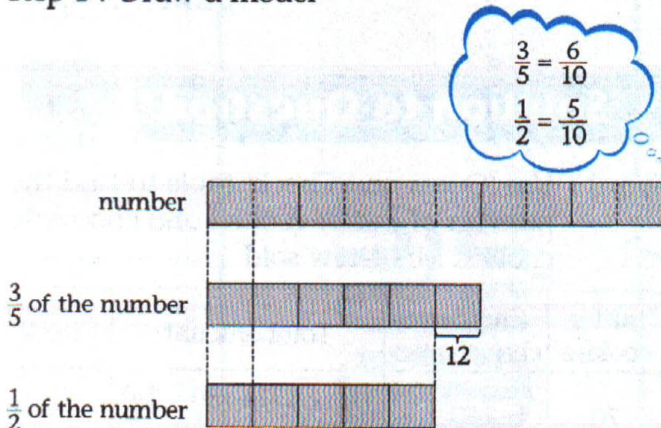
Answers: John: 40 marbles

Jane: 140 marbles

Solution to Question

13

Step 1 : Draw a model



Step 2 : Find the number

$$1 \text{ unit} \rightarrow 12$$

$$10 \text{ units} \rightarrow 10 \times 12 = 120$$

Step 3 : Find the difference between the number and its 4th multiple

$$4\text{th multiple} \rightarrow 4 \times 120 = 480$$

$$480 - 120 = 360$$

The difference between the number and its 4th multiple is 360.

Answer: 360

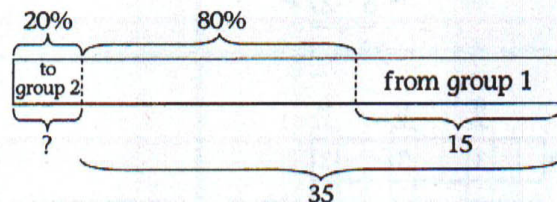
Solution to Question

14

Step 1 : Find the number of students in each group in the end

$$105 \div 3 = 35$$

Step 2 : Find the number of students in group 3 at first



$$35 - 15 = 20$$

$$80\% \rightarrow 20$$

$$20\% \rightarrow \frac{20}{80} \times 20 = 5$$

$$20 + 5 = 25$$

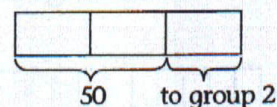
Step 3 : Find the number of students in group 1 at first

$$35 + 15 = 50$$

$$2 \text{ units} \rightarrow 50$$

$$1 \text{ unit} \rightarrow 50 \div 2 = 25$$

$$3 \text{ units} \rightarrow 3 \times 25 = 75$$



Step 4 : Find the number of students in group 2 at first

$$35 - 5 - 25 = 5$$

There were 75 students in group 1, 5 students in group 2 and 25 students in group 3 at first.

Answers: Group 1: 75

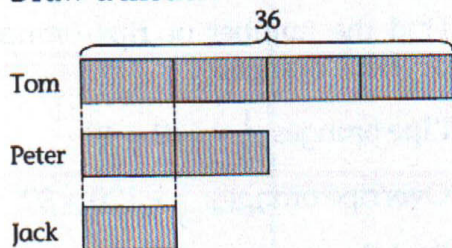
Group 2: 5

Group 3: 25

Solution to Question

15

Step 1 : Draw a model



Step 2 : Find Peter's age in 2000

$$\text{Peter's age in 1998: } 36 \div 2 = 18$$

$$\text{Peter's age in 2000: } 18 + 2 = 20$$

(a) Peter would be 20 years old in 2000.

Step 3 : Find Jack's age in 2000

$$\text{Jack's age in 1998: } 18 \div 2 = 9$$

$$\text{Jack's age in 2000: } 9 + 2 = 11$$

Step 4 : Find their total age in 2003

$$(38 + 3) + (20 + 3) + (11 + 3) \\ = 41 + 23 + 14 = 78$$

(b) Their total age in 2003 would be 78 years.

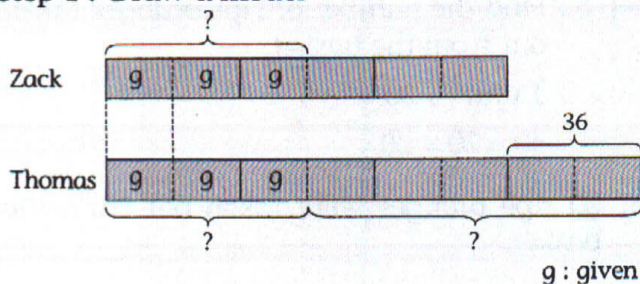
Answers: (a) 20 years old

(b) 78 years

Solution to Question

16

Step 1 : Draw a model



Step 2 : Find the number of toy cars given to them altogether

$$2 \text{ units} \rightarrow 36$$

$$1 \text{ unit} \rightarrow 36 \div 2 \\ = 18$$

$$6 \text{ units} \rightarrow 6 \times 18 \\ = 108$$

(a) They were given 108 toy cars altogether.

Step 3 : Find the number of toy cars Thomas had at first

$$5 \text{ units} \rightarrow 5 \times 18 = 90$$

(b) Thomas had 90 toys cars at first.

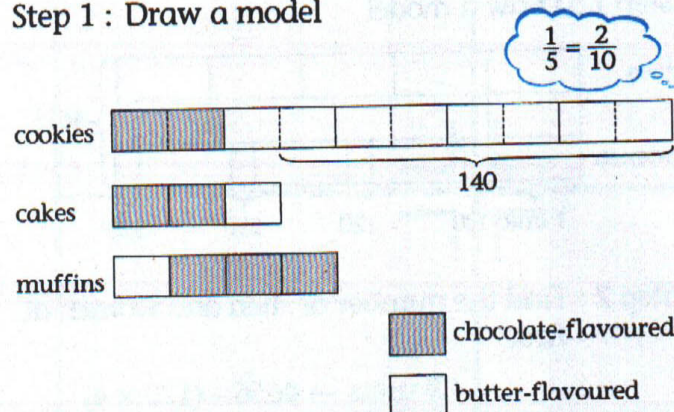
Answers: (a) 108 toy cars

(b) 90 toy cars

Solution to Question

17

Step 1 : Draw a model



Step 2 : Find how many more butter-flavoured cookies, cakes and muffins were sold than chocolate-flavoured ones

7 units \rightarrow chocolate-flavoured
10 units \rightarrow butter-flavoured

$$7 \text{ units} \rightarrow 140$$

$$1 \text{ unit} \rightarrow 140 \div 7 = 20$$

$$10 \text{ units} \rightarrow 10 \times 20 = 200$$

$$200 - 140 = 60$$

(a) 60 more butter-flavoured than chocolate-flavoured cookies, cakes and muffins were sold.

Step 3 : Find the total amount of money Joanne earned

$$\text{Cookies: } 10 \text{ units} \rightarrow 10 \times 20 = 200 \\ 200 \times \$0.50 = \$100$$

$$\text{Cakes: } 3 \text{ units} \rightarrow 3 \times 20 = 60 \\ 60 \times \$1.50 = \$90$$

$$\text{Muffins: } 4 \text{ units} \rightarrow 4 \times 20 = 80 \\ 80 \times \$2 = \$160$$

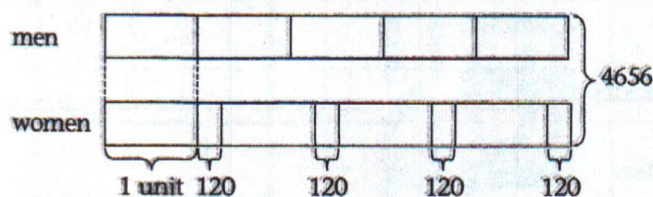
$$\$100 + \$90 + \$160 = \$350$$

(b) Joanne collected \$350 altogether.

Answers: (a) 60 more

(b) \$350

Step 1 : Draw a model



Step 2 : Find the number of men and women at first

$$\begin{aligned} 9 \text{ units} &\rightarrow 4656 - (120 \times 4) \\ &= 4656 - 480 \\ &= 4176 \end{aligned}$$

$$1 \text{ unit} \rightarrow 4176 \div 9 = 464$$

$$\text{Men: } 5 \text{ units} \rightarrow 5 \times 464 = 2320$$

$$\begin{aligned} \text{Women: } 4 \text{ units} &\rightarrow (4 \times 464) + 480 \\ &= 1856 + 480 \\ &= 2336 \end{aligned}$$

Step 3 : Find how many more women than men there were at first

$$2336 - 2320 = 16$$

There were 16 more women than men.

Answer: 16 more women

Step 1 : Find the number of ripe oranges and overripe oranges

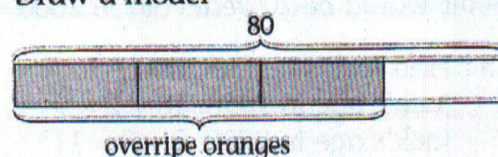
$$\text{Ripe oranges: } \frac{1}{3} \times 120 = 40$$

$$\text{Overripe oranges: } \frac{2}{3} \times 120 = 80$$

Step 2 : Find the number of oranges left in the basket

$$120 - 40 = 80$$

Step 3 : Draw a model



Step 4 : Find the number of overripe oranges taken out from the basket

$$4 \text{ units} \rightarrow 80$$

$$1 \text{ unit} \rightarrow 80 \div 4 = 20$$

$$3 \text{ units} \rightarrow 3 \times 20 = 60$$

$$80 - 60 = 20$$

(a) 20 overripe oranges were taken out from the basket.

Step 5 : Find the number of ripe oranges taken out from the basket

$$1 \text{ unit} \rightarrow 20$$

$$40 - 20 = 20$$

(b) 20 ripe oranges were taken out from the basket.

Step 6 : Find how many more overripe than ripe oranges were left

$$60 - 20 = 40$$

(c) 40 more overripe than ripe oranges were left.

Answers: (a) 20 overripe oranges

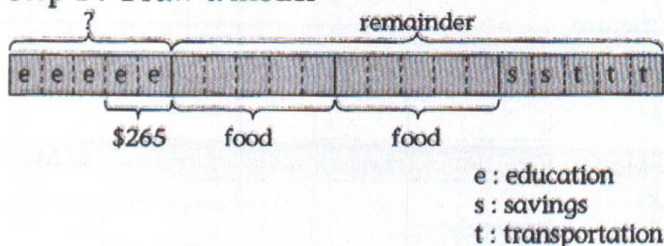
(b) 20 ripe oranges

(c) 40 more overripe oranges

Solution to Question

20

Step 1 : Draw a model



Step 2 : Find the amount of money she spent on her children's education every month

$$2 \text{ units} \rightarrow \$265$$

$$1 \text{ unit} \rightarrow \$265 \div 2$$

$$= \$132.50$$

$$5 \text{ units} \rightarrow 5 \times \$132.50$$

$$= \$662.50$$

Step 3 : Find the amount of money she spent on her children's education in half a year

$$6 \times \$662.50 = \$3975$$

She spent \$3975 on her children's education in half a year.

Answer: \$3975

Solution to Question

21

Step 1 : Find the capacity and volume of water in tank A

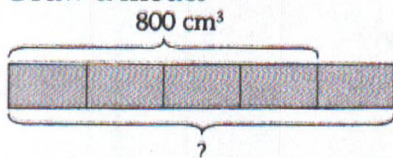
$$\text{Capacity of tank A} = 12 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm} \\ = 2400 \text{ cm}^3$$

$$\text{Volume of water in tank A} = \frac{2}{3} \times 2400 \text{ cm}^3 \\ = 1600 \text{ cm}^3$$

Step 2 : Find the volume of water poured into tank B

$$1600 \text{ cm}^3 \div 2 = 800 \text{ cm}^3$$

Step 3 : Draw a model



Step 4 : Find the capacity of tank B

$$4 \text{ units} \rightarrow 800 \text{ cm}^3$$

$$1 \text{ unit} \rightarrow 800 \text{ cm}^3 \div 4 = 200 \text{ cm}^3$$

$$5 \text{ units} \rightarrow 5 \times 200 \text{ cm}^3 = 1000 \text{ cm}^3$$

Step 5 : Find the total capacity of the two tanks

$$2400 \text{ cm}^3 + 1000 \text{ cm}^3 = 3400 \text{ cm}^3 = 3.4 \text{ l}$$

The total capacity of the two tanks was 3.4 l.

Answer: 3.4 l

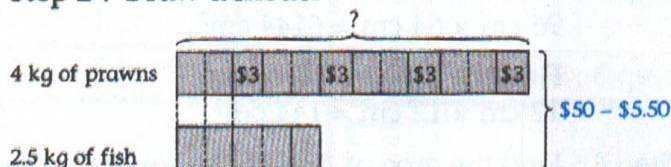
Solution to Question

22

Step 1 : Find the mass of the prawns Mrs Bowles bought

$$2.5 \text{ kg} + 1.5 \text{ kg} = 4 \text{ kg}$$

Step 2 : Draw a model



Step 3 : Find the amount of money she spent on buying the fish and prawns

$$\$50 - \$5.50 = \$44.50$$

Step 4 : Find the amount of money Mrs Bowles spent on prawns

$$4 \times \$3 = \$12$$

$$\$44.50 - \$12 = \$32.50$$

$$13 \text{ units} \rightarrow \$32.50$$

$$1 \text{ unit} \rightarrow \$32.50 \div 13 = \$2.50$$

$$8 \text{ units} \rightarrow 8 \times \$2.50 = \$20$$

$$\$20 + \$12 = \$32$$

She spent \$32 on prawns.

Answer: \$32

Solution to Question

23

Step 1 : Find the height of the remaining water in the container

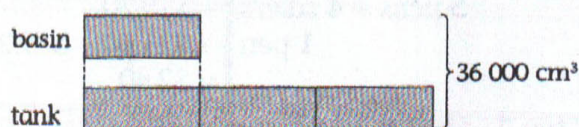
$$\frac{4}{5} \times 25 \text{ cm} = 20 \text{ cm}$$

$$20 \text{ cm} - 5 \text{ cm} = 15 \text{ cm}$$

Step 2 : Find the volume of the remaining water in the container

$$60 \text{ cm} \times 40 \text{ cm} \times 15 \text{ cm} = 36\,000 \text{ cm}^3$$

Step 3 : Draw a model



Step 4 : Find the volume of water in the tank

$$4 \text{ units} \rightarrow 36\,000 \text{ cm}^3$$

$$1 \text{ unit} \rightarrow 36\,000 \text{ cm}^3 \div 4 = 9000 \text{ cm}^3$$

$$3 \text{ units} \rightarrow 3 \times 9000 \text{ cm}^3 = 27\,000 \text{ cm}^3$$

Step 5 : Find the height of the water in the tank

$$27\,000 \text{ cm}^3 = 18 \text{ cm} \times 15 \text{ cm} \times \text{Height}$$

$$27\,000 \text{ cm}^3 = 270 \text{ cm}^2 \times \text{Height}$$

$$\text{Height} = 27\,000 \text{ cm}^3 \div 270 \text{ cm}^2 \\ = 100 \text{ cm}$$

The height of the water in the tank was 100 cm.

Answer: 100 cm

Solution to Question

24

Step 1 : Find the breadth of the rectangle

$$320 \text{ cm} - 96 \text{ cm} - 96 \text{ cm} = 128 \text{ cm}$$

$$128 \text{ cm} \div 2 = 64 \text{ cm}$$

Step 2 : Find the area of the rectangle

$$96 \text{ cm} \times 64 \text{ cm} = 6144 \text{ cm}^2$$

Step 3 : Find the area of the square

$$12 \text{ cm} \times 12 \text{ cm} = 144 \text{ cm}^2$$

Step 4 : Find the area of half of the square

$$144 \text{ cm}^2 \div 2 = 72 \text{ cm}^2$$

Step 5 : Find the area of the quarter circle in the square

$$\frac{1}{4} \times \pi \times r \times r = \frac{1}{4} \times 3.14 \times 12 \text{ cm} \times 12 \text{ cm} \\ = 113.04 \text{ cm}^2$$

Step 6 : Find the area of the shaded parts in the two squares

$$113.04 \text{ cm}^2 - 72 \text{ cm}^2 = 41.04 \text{ cm}^2$$

$$4 \times 41.04 \text{ cm}^2 = 164.16 \text{ cm}^2$$

Step 7 : Find the area of the shaded parts of the figure

$$6144 \text{ cm}^2 - (2 \times 144 \text{ cm}^2) = 5856 \text{ cm}^2$$

$$5856 \text{ cm}^2 + 164.16 \text{ cm}^2 = 6020.16 \text{ cm}^2$$

The area of the shaded parts of the figure is 6020.16 cm².

Answer: 6020.16 cm²

Solution to Question

25

Step 1 : Find the cost of each pen

$$3 \text{ pens} + 2 \text{ rulers} \rightarrow \$10.80$$

$$6 \text{ pens} + 4 \text{ rulers} \rightarrow 2 \times \$10.80 = \$21.60$$

$$5 \text{ pens} + 4 \text{ rulers} \rightarrow \$19.20$$

$$1 \text{ pen} \rightarrow \$21.60 - \$19.20$$

$$= \$2.40$$

Step 2 : Find the cost of two rulers

$$3 \text{ pens} + 2 \text{ rulers} \rightarrow \$10.80$$

$$2 \text{ rulers} \rightarrow \$10.80 - (3 \times \$2.40)$$

$$= \$10.80 - \$7.20$$

$$= \$3.60$$

Step 3 : Find the amount of money Nick spent

$$\$20 - \$6.80 = \$13.20$$

Step 4 : Find the number of pens Nick bought

$$\$13.20 - \$3.60 = \$9.60$$

$$\$9.60 \div \$2.40 = 4$$

Nick bought 4 pens.

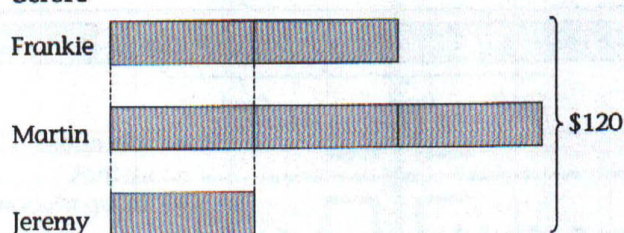
Answer: 4 pens

Solution to Question

26

Step 1 : Draw a model

Before



Step 2 : Find the amount of money for each equal part

$$\$120 \div 6 = \$20$$

Step 3 : Find the amount of money Martin had given to Frankie

$$\text{Martin: } 3 \text{ units} \rightarrow 3 \times \$20 = \$60$$

$$\$60 \div 4 = \$15$$

Step 4 : Find the amount of money Frankie had in the end

$$\text{Frankie: } 2 \text{ units} \rightarrow 2 \times \$20 = \$40$$

$$\$40 + \$15 = \$55$$

Step 5 : Find the amount of money Jeremy had in the end

$$4 \times \$20 = \$80$$

Step 6 : Find how much more money Jeremy had than Frankie in the end

$$\$80 - \$55 = \$25$$

Jeremy had \$25 more than Frankie in the end.

Answer: \$25

Step 1 : Find the volume of water flowing from tap B per minute

$$10 \text{ litres} \div 2 \text{ minutes} \\ = 5 \text{ litres per minute}$$

Step 2 : Find the total volume of water flowing from the two taps per minute

$$5 \text{ litres} + 4 \text{ litres} = 9 \text{ litres}$$

Step 3 : Find the volume of water in the tank after 1.5 minutes

$$1 \text{ l} = 1000 \text{ cm}^3$$

$$9 \text{ litres} \times 1.5 \text{ minute} = 13.5 \text{ litres} \\ = 13\,500 \text{ cm}^3$$

Step 4 : Find the capacity of the tank

$$\frac{1}{4} \text{ of the tank} \rightarrow 13\,500 \text{ cm}^3$$

$$\text{Full tank} \rightarrow 4 \times 13\,500 \text{ cm}^3 \\ = 54\,000 \text{ cm}^3$$

Step 5 : Find the height of the tank

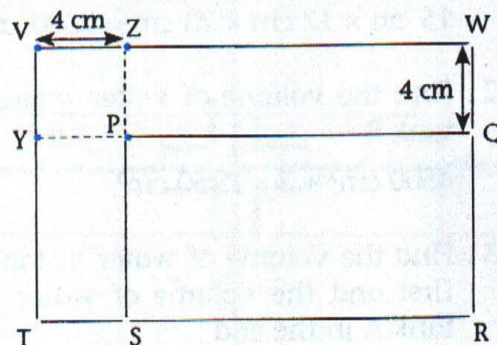
$$\text{Base area} = 90 \text{ cm} \times 10 \text{ cm} = 900 \text{ cm}^2$$

$$\text{Height} = 54\,000 \text{ cm}^3 \div 900 \text{ cm}^2 = 60 \text{ cm}$$

The height of the tank was 60 cm.

Answer: 60 cm

Step 1 : Find the area of square VZPY



$$4 \text{ cm} \times 4 \text{ cm} = 16 \text{ cm}^2$$

Step 2 : Find the total area of rectangles YPST and ZWQP

$$226 \text{ cm}^2 - 16 \text{ cm}^2 = 210 \text{ cm}^2$$

Step 3 : Find the breadth of rectangle PQRS

$$\text{Area YPST} + \text{Area ZWQP} = 210 \text{ cm}^2$$

$$(4 \text{ cm} \times \text{PS}) + (4 \text{ cm} \times \text{PQ}) = 210 \text{ cm}^2$$

$$\text{Given } \text{PQ} = 2 \times \text{PS}$$

$$(4 \text{ cm} \times \text{PS}) + (4 \text{ cm} \times 2 \times \text{PS}) = 210 \text{ cm}^2$$

$$12 \text{ cm} \times \text{PS} = 210 \text{ cm}^2$$

$$\text{PS} = 210 \text{ cm}^2 \div 12 \text{ cm} = 17.5 \text{ cm}$$

Step 4 : Find the length of rectangle PQRS

$$2 \times 17.5 \text{ cm} = 35 \text{ cm}$$

Step 5 : Find the perimeter of rectangle PQRS

$$17.5 \text{ cm} + 17.5 \text{ cm} + 35 \text{ cm} + 35 \text{ cm} = 105 \text{ cm}$$

The perimeter of rectangle PQRS is 105 cm.

Answer: 105 cm

Solution to Question

29

Step 1 : Find the capacity of tank B

$$15 \text{ cm} \times 12 \text{ cm} \times 25 \text{ cm} = 4500 \text{ cm}^3$$

Step 2 : Find the volume of water poured into tank B

$$4500 \text{ cm}^3 \div 2 = 2250 \text{ cm}^3$$

Step 3 : Find the volume of water in tank A at first and the volume of water left in tank A in the end

$$\frac{2}{5} \text{ of tank A} \rightarrow 2250 \text{ cm}^3$$

$$\frac{1}{5} \text{ of tank A} \rightarrow 2250 \text{ cm}^3 \div 2 = 1125 \text{ cm}^3$$

$$\frac{5}{5} \text{ of tank A} \rightarrow 5 \times 1125 \text{ cm}^3 = 5625 \text{ cm}^3$$

Tank A had 5625 cm^3 of water at first.

$$\frac{3}{5} \rightarrow 3 \times 1125 \text{ cm}^3 = 3375 \text{ cm}^3$$

3375 cm^3 of water is left in tank A in the end.

Step 4 : Find the capacity of tank A

$$30\% \rightarrow 5625 \text{ cm}^3$$

$$10\% \rightarrow 5625 \text{ cm}^3 \div 3 = 1875 \text{ cm}^3$$

$$100\% \rightarrow 10 \times 1875 \text{ cm}^3 = 18\,750 \text{ cm}^3$$

Step 5 : Find the volume of water needed now to fill tank A completely

$$18\,750 \text{ cm}^3 - 3375 \text{ cm}^3 = 15\,375 \text{ cm}^3$$

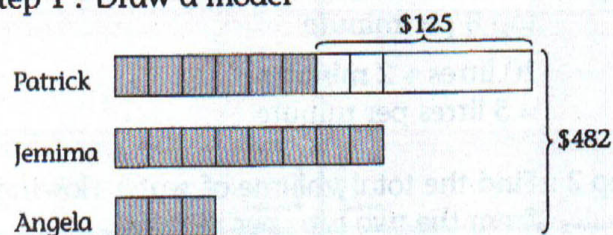
$15\,375 \text{ cm}^3$ of water is needed now to fill tank A completely.

Answer: $15\,375 \text{ cm}^3$

Solution to Question

30

Step 1 : Draw a model



Step 2 : Find the amount of money for each equal part

$$\$482 - \$125 = \$357$$

$$17 \text{ units} \rightarrow \$357$$

$$1 \text{ unit} \rightarrow \$357 \div 17 = \$21$$

Step 3 : Find the total sum of money Patrick and Angela had at first

$$9 \text{ units} \rightarrow 9 \times \$21 = \$189$$

$$\$189 + \$125 = \$314$$

Patrick and Angela had $\$314$ at first.

Answer: $\$314$

Solution to Question

31

Step 1 : Find the ratio of red and yellow beads after using 30 yellow beads

red : yellow

$$10 : 9$$

(before using 30 yellow beads)

$$5 : 2$$

(after using 30 yellow beads)

$$\begin{array}{c} \times 2 \quad \swarrow \quad \searrow \quad \times 2 \\ 10 : 4 \end{array}$$

Step 2 : Find the number of red and yellow beads Margaret had at first

$$9 \text{ units} - 4 \text{ units} = 5 \text{ units}$$

$$5 \text{ units} \rightarrow 30$$

$$1 \text{ unit} \rightarrow 30 \div 5 = 6$$

$$\text{red beads: } 10 \text{ units} \rightarrow 10 \times 6 = 60$$

$$\text{yellow beads: } 9 \text{ units} \rightarrow 9 \times 6 = 54$$

Step 3 : Find how much Margaret paid for the total number of beads she had at first

$$60 \text{ red beads} \rightarrow 60 \times 90\text{c} = 5400\text{c} = \$54$$

$$1 \text{ yellow bead} \rightarrow 90\text{c} + 20\text{c} = 110\text{c}$$

$$54 \text{ yellow beads} \rightarrow 54 \times 110\text{c} = 5940\text{c} = \$59.40$$

$$\$54 + \$59.40 = \$113.40$$

Margaret paid $\$113.40$ for the total number of beads she had at first.

Answer: $\$113.40$

Solution to Question

32

Step 1 : Find the area of the semicircle

$$\text{Radius} = 12 \text{ cm} \div 2 = 6 \text{ cm}$$

$$\frac{1}{2} \times \pi r^2 = \frac{1}{2} \times 3.14 \times 6 \text{ cm} \times 6 \text{ cm} = 56.52 \text{ cm}^2$$

Step 2 : Find the area of the small triangle

$$\begin{aligned} \frac{1}{2} \times \text{Base} \times \text{Height} \\ = \frac{1}{2} \times 8 \text{ cm} \times (36 - 5 - 6) \text{ cm} \\ = \frac{1}{2} \times 8 \text{ cm} \times 25 \text{ cm} \\ = 100 \text{ cm}^2 \end{aligned}$$

Step 3 : Find the area of triangle PQR

$$\begin{aligned} \frac{1}{2} \times \text{Base} \times \text{Height} \\ = \frac{1}{2} \times 12 \text{ cm} \times 36 \text{ cm} \\ = 216 \text{ cm}^2 \end{aligned}$$

Step 4 : Find the area of the unshaded portion

$$\begin{aligned} 56.52 \text{ cm}^2 + 100 \text{ cm}^2 &= 156.52 \text{ cm}^2 \\ 216 \text{ cm}^2 - 156.52 \text{ cm}^2 &= 59.48 \text{ cm}^2 \end{aligned}$$

The area of the unshaded portion is 59.48 cm².

Answer: 59.48 cm²

Solution to Question

33

Step 1 : Find the volume of water collected in the tank after 10 minutes

$$\begin{aligned} 2 \times 7 \text{ l} &= 14 \text{ l} \\ 10 \text{ min} \times 14 \text{ l} &= 140 \text{ l} \end{aligned}$$

Step 2 : Find the volume of water needed to fill the tub completely

$$30\% \times 140 \text{ l} = \frac{30}{100} \times 140 \text{ l} = 42 \text{ l}$$

$$\begin{aligned} \frac{3}{4} \text{ of the tub} &\rightarrow 42 \text{ l} \\ \frac{1}{4} \text{ of the tub} &\rightarrow 42 \text{ l} \div 3 = 14 \text{ l} \\ &= 14 \text{ 000 cm}^3 \end{aligned}$$

Step 3 : Find the capacity of the tank

$$70 \text{ cm} \times 45 \text{ cm} \times 50 \text{ cm} = 157 \text{ 500 cm}^3$$

Step 4 : Find the volume of water needed to fill the tank completely

$$\begin{aligned} 70\% \times 140 \text{ l} &= \frac{70}{100} \times 140 \text{ l} = 98 \text{ l} \\ 157 \text{ 500 cm}^3 - 98 \text{ l} \\ &= 157 \text{ 500 cm}^3 - 98 \text{ 000 cm}^3 \\ &= 59 \text{ 500 cm}^3 \end{aligned}$$

Step 5 : Find the total volume of water needed to fill the tub and tank completely

$$59 \text{ 500 cm}^3 + 14 \text{ 000 cm}^3 = 73 \text{ 500 cm}^3$$

73 500 cm³ of water is needed to fill the tub and tank completely.

Answer: 73 500 cm³ or 73.5 l

Solution to Question

34

Use the common multiples of 3, 4 and 6 to find the time when the three clocks will chime at the same time

$$60 \text{ min} = 1 \text{ h}$$

First clock:

3 6 9 12 15 18 21 24 27 30 36 39
42 45 48 51 54 57 60

Second clock:

4 8 12 16 20 24 28 32 36 40 44 48
52 56 60

Third clock:

6 12 18 24 30 36 42 48 54 60

The 3 clocks would chime together again 5 times in the next one hour.

Answer: 5 times

Solution to Question

35

Step 1 : Find the ratio of the amount of money they spent

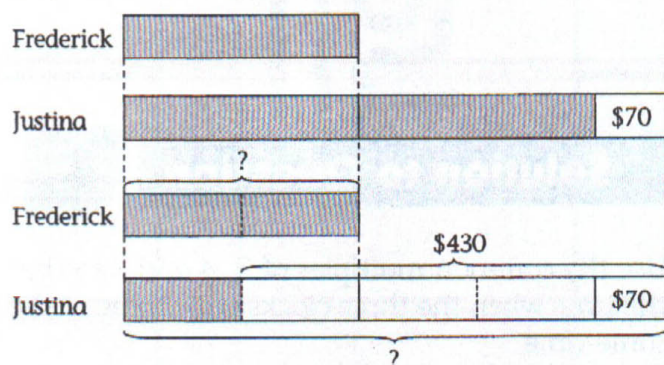
When Frederick spent \$8 and Justina spent \$16,

$$\begin{array}{rcl} \text{Frederick} & : & \text{Justina} \\ 8 & : & 16 \\ 1 & : & 2 \end{array}$$

When Frederick spent \$16 and Justina spent \$8,

$$\begin{array}{rcl} \text{Frederick} & : & \text{Justina} \\ 16 & : & 8 \\ 2 & : & 1 \end{array}$$

Step 2 : Draw a model



Step 3 : Find each equal part

$$\$430 - \$70 = \$360$$

$$\$360 \div 3 = \$120$$

Step 4 : Find the amount of money Frederick received from their parents

$$2 \times \$120 = \$240$$

Step 5 : Find the amount of money Justina received from their parents

$$\$430 + \$120 = \$550$$

Frederick received \$240 and Justina received \$550 from their parents.

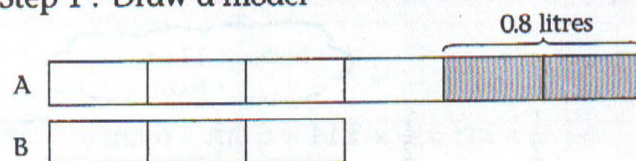
Answers: Frederick: \$240

Justina: \$550

Solution to Question

36

Step 1 : Draw a model



Step 2 : Find the volume of water in tank A

$$2 \text{ units} \rightarrow 0.8 \text{ l}$$

$$1 \text{ unit} \rightarrow 0.8 \text{ l} \div 2 = 0.4 \text{ l}$$

$$6 \text{ units} \rightarrow 6 \times 0.4 = 2.4 \text{ l}$$

Step 3 : Find the capacity of tank B

$$\frac{1}{4} \text{ of tank B} \rightarrow 2.4 \text{ l}$$

$$\frac{4}{4} \text{ of tank B} \rightarrow 4 \times 2.4 \text{ l} = 9.6 \text{ l}$$

Step 4 : Find the volume of water in tank B

$$3 \text{ units} \rightarrow 3 \times 0.4 \text{ l} = 1.2 \text{ l}$$

Step 5 : Find the volume of water needed to fill tank B to its brim

$$9.6 \text{ l} - 1.2 \text{ l} = 8.4 \text{ l}$$

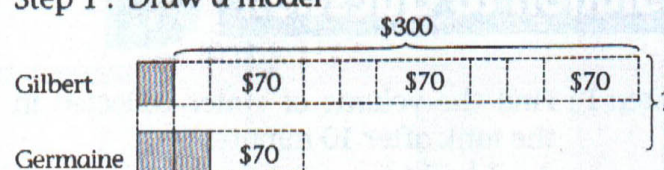
8.4 litres of water is needed to fill tank B to its brim.

Answer: 8.4 litres

Solution to Question

37

Step 1 : Draw a model



Step 2 : Find the amount of money for each equal part

$$3 \times \$70 = \$210$$

$$\$300 - \$210 = \$90$$

$$5 \text{ units} \rightarrow \$90$$

$$1 \text{ unit} \rightarrow \$90 \div 5 = \$18$$

Step 3 : Find the sum of money they had in the end

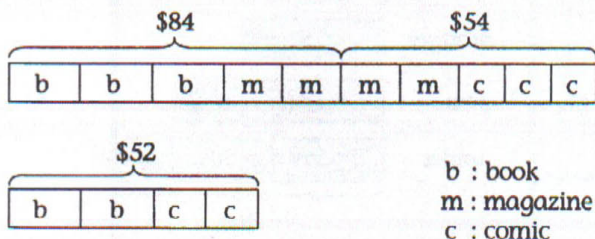
$$8 \text{ units} \rightarrow 8 \times \$18 = \$144$$

$$\$144 + \$210 = \$354$$

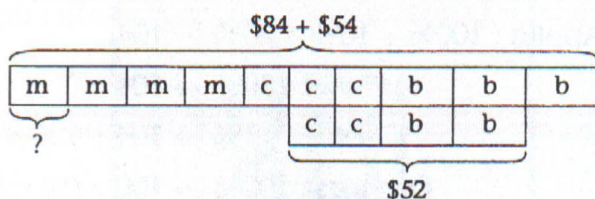
They had \$354 in the end.

Answer: \$354

Step 1 : Draw a model



Rearrange the model



Step 2 : Find the cost of 3 comics and 3 books

2 comics and 2 books \rightarrow \$52

1 comic and 1 book \rightarrow $\$52 \div 2$
= \$26

3 comics and 3 books \rightarrow $\$26 + \52
= \$78

Step 3 : Find the cost of 4 magazines

$(\$84 + \$54) - \$78 = \60

Step 4 : Find the cost of 1 magazine

$\$60 \div 4 = \15

The cost of 1 magazine is \$15.

Answer: \$15

Step 1 : Find the area of the larger circle

$$\pi \times r \times r = \frac{22}{7} \times 21 \text{ cm} \times 21 \text{ cm}$$

$$= 1386 \text{ cm}^2$$

Step 2 : Find the area of the smaller circle

$$\pi \times r \times r = \frac{22}{7} \times 7 \text{ cm} \times 7 \text{ cm}$$

$$= 154 \text{ cm}^2$$

Step 3 : Find the area of the shaded part

$$1386 \text{ cm}^2 - 154 \text{ cm}^2 = 1232 \text{ cm}^2$$

Step 4 : Find the unshaded area

$$2 \text{ units} \rightarrow 1232 \text{ cm}^2$$

$$1 \text{ unit} \rightarrow 1232 \text{ cm}^2 \div 2 = 616 \text{ cm}^2$$

$$7 \text{ units} \rightarrow 7 \times 616 \text{ cm}^2 = 4312 \text{ cm}^2$$

The area of the unshaded portion of the figure is 4312 cm².

Answer: 4312 cm²

Step 1 : Find the capacity of the container

$$12 \text{ cm} \times 15 \text{ cm} \times 30 \text{ cm} = 5400 \text{ cm}^3$$

Step 2 : Find the volume of water poured into the container from the tub

$$\frac{1}{3} \times 5400 \text{ cm}^3 = 1800 \text{ cm}^3$$

Step 3 : Find the capacity of the tub

$$80\% \rightarrow 1800 \text{ cm}^3$$

$$100\% \rightarrow \frac{1800}{80} \text{ cm}^3 \times 100$$

$$= 2250 \text{ cm}^3$$

Step 4 : Find the water level in the tub at first

$$\text{Base area} \rightarrow 24 \text{ cm} \times 15 \text{ cm} = 360 \text{ cm}^2$$

$$2250 \text{ cm}^3 \div 360 \text{ cm}^2 = 6.25 \text{ cm}$$

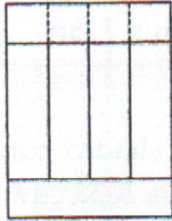
The water level in the tub was 6.25 cm at first.

Answer: 6.25 cm

Step 1 : Find the area of each rectangle

$$864 \text{ cm}^2 \div 6 = 144 \text{ cm}^2$$

Step 2 : Divide the top rectangle into 4 similar squares (See dotted lines below)



Step 3 : Find the side of one square (breadth of the rectangle)

$$4 \text{ squares} \rightarrow 144 \text{ cm}^2 \div 4 = 36 \text{ cm}^2$$

$$1 \text{ square} \rightarrow 36 \text{ cm}^2 = 6 \text{ cm} \times 6 \text{ cm}$$

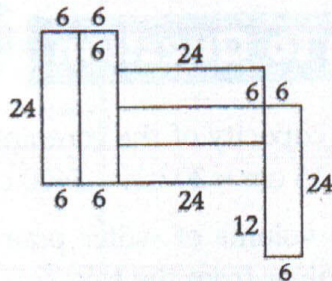
Breadth of rectangle is 6cm.

Step 4 : Find the length of the rectangle

$$4 \times 6 \text{ cm} = 24 \text{ cm}$$

Length of rectangle is 24 cm.

Step 5 : Find the perimeter of figure B

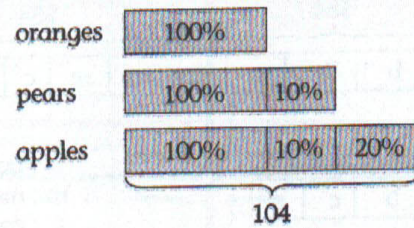


$$24 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} + 24 \text{ cm} + 6 \text{ cm} + 12 \text{ cm} + 24 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} + 24 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} = 156 \text{ cm}$$

The perimeter of figure B is 156 cm.

Answer: 156 cm

Step 1 : Draw a model



Step 2 : Find the number of apples, oranges and pears

$$\text{Apples : } 100\% + 10\% + 20\% \rightarrow 104$$

$$130\% \rightarrow 104$$

$$1\% \rightarrow 104 \div 130 = 0.8$$

$$\text{Oranges : } 100\% \rightarrow 100 \times 0.8 = 80$$

$$\text{Pears : } 110\% \rightarrow 110 \times 0.8 = 88$$

Step 3 : Find how much the apples, oranges and pears were sold for

$$\text{Apples: } (104 \div 4) \times \$6 = \$156$$

$$\text{Oranges: } (80 \div 2) \times \$3 = \$120$$

$$\text{Pears: } (88 \div 8) \times \$10 = \$110$$

Step 4 : Find how much money the fruiterer collected

$$\$156 + \$120 + \$110 = \$386$$

The fruiterer collected \$386.

Answer: \$386

Step 1 : Find the cost of an apple

| | |
|-----------------------------------|---------------------------------|
| 4 oranges + 3 apples + 2 papayas | → \$15.50 |
| 12 oranges + 9 apples + 6 papayas | → $3 \times \$15.50 = \46.50 |
| 2 oranges + 6 papayas | → \$28.60 |
| 10 oranges + 9 apples | → $\$46.50 - \$28.60 = \$17.90$ |
| 30 oranges + 27 apples | → $3 \times \$17.90 = \53.70 |
| 3 oranges + 4 apples | → \$6.80 |
| 30 oranges + 40 apples | → $10 \times \$6.80 = \68 |
| 13 apples | → $\$68 - \$53.70 = \$14.30$ |

$$13 \text{ apples} \rightarrow \$14.30$$

$$1 \text{ apple} \rightarrow \$14.30 \div 13 = \$1.10$$

Step 2 : Find the cost of an orange

$$3 \text{ oranges and 4 apples} \rightarrow \$6.80$$

$$4 \text{ apples} \rightarrow 4 \times \$1.10 = \$4.40$$

$$3 \text{ oranges} \rightarrow \$6.80 - \$4.40 = \$2.40$$

$$1 \text{ orange} \rightarrow \$2.40 \div 3 = \$0.80$$

Step 3 : Find the cost of a papaya

$$2 \text{ oranges and 6 papayas} \rightarrow \$28.60$$

$$2 \text{ oranges} \rightarrow 2 \times \$0.80 = \$1.60$$

$$6 \text{ papayas} \rightarrow \$28.60 - \$1.60 = \$27$$

$$1 \text{ papaya} \rightarrow \$27 \div 6 = \$4.50$$

Each apple costs \$1.10, each orange costs \$0.80 and each papaya costs \$4.50.

Answers: Apple: \$1.10

Orange: \$0.80

Papaya: \$4.50

Step 1 : Find the volume of water in the pail per minute

$$3 \text{ l} - 0.5 \text{ l} = 2.5 \text{ l}$$

Step 2 : Find the volume of water in the pail at 9.30 am

$$\begin{aligned} 7 \text{ am to } 9.30 \text{ am} &= 2 \text{ h } 30 \text{ min} \\ &= 120 \text{ min} + 30 \text{ min} \\ &= 150 \text{ min} \end{aligned}$$

$$\begin{aligned} 2.5 \text{ l} \times 2 \text{ h } 30 \text{ min} &= 2.5 \text{ l} \times 150 \text{ min} \\ &= 375 \text{ l} \end{aligned}$$

(a) There would be 375 l of water in the pail at 9.30 am

Step 3 : Find the time needed to fill the pail with 10 l of water

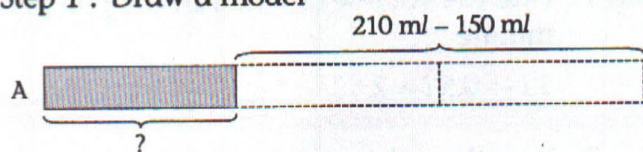
$$10 \text{ l} \div 2.5 \text{ l} = 4 \text{ min}$$

(b) It would take 4 minutes to fill the pail with 10 l of water.

Answers: (a) 375 l

(b) 4 minutes

Step 1 : Draw a model

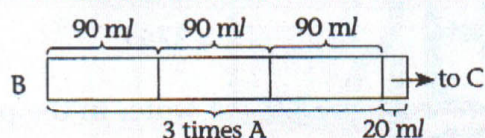


Step 2 : Find the volume of orange juice in container A at first

$$2 \text{ units} \rightarrow 210 \text{ ml} - 150 \text{ ml} = 60 \text{ ml}$$

$$1 \text{ unit} \rightarrow 60 \text{ ml} \div 2 = 30 \text{ ml}$$

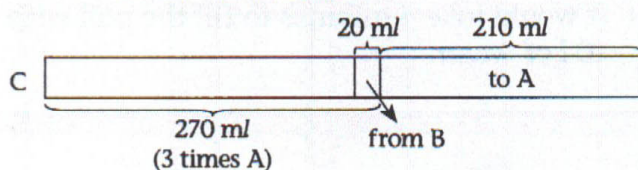
Step 3 : Find the volume of orange juice in container B at first



$$3 \times (3 \times 30 \text{ ml}) = 270 \text{ ml}$$

$$270 \text{ ml} + 20 \text{ ml} = 290 \text{ ml}$$

Step 4 : Find the volume of orange juice in container C at first



$$270 \text{ ml} + 210 \text{ ml} = 480 \text{ ml}$$

$$480 \text{ ml} - 20 \text{ ml} = 460 \text{ ml}$$

- (a) 30 ml of orange juice was in container A, 290 ml of orange juice was in container B and 460 ml of orange juice was in container C at first.

Step 5 : Find the volume of orange juice in the carton at first

$$30 \text{ ml} + 290 \text{ ml} + 460 \text{ ml} = 780 \text{ ml}$$

- (b) 780 ml of orange juice was in the carton at first.

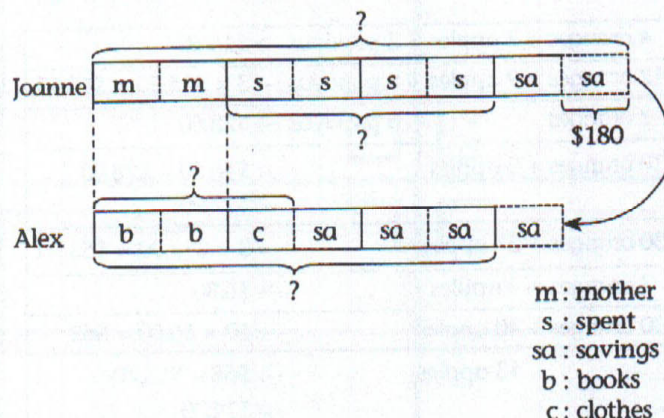
Answers: (a) Container A: 30 ml

Container B: 290 ml

Container C: 460 ml

(b) 780 ml

Step 1 : Draw a model



Step 2 : Find the amount of money each of them had at first

$$\text{Joanne: } 8 \times \$180 = \$1440$$

$$\text{Alex: } 6 \times \$180 = \$1080$$

- (a) Joanne had \$1440 and Alex had \$1080 at first.

Step 3 : Find the total amount of money they spent

$$7 \times \$180 = \$1260$$

- (b) They spent \$1260 altogether.

Answers: (a) Joanne: \$1440

Alex: \$1080

(b) \$1260

Step 1 : Find the volume of water in the tank every 1 minute

$$\text{Water entering tank} \rightarrow 2 \times 6 \text{ litres} \\ = 12 \text{ litres}$$

$$\text{Water leaving tank} \rightarrow 8 \text{ litres} \div 4 \\ = 2 \text{ litres}$$

$$12 \text{ litres} - 2 \text{ litres} = 10 \text{ litres}$$

Step 2 : Find the volume of water after 10 minutes

$$1 \text{ minute} \rightarrow 10 \text{ litres}$$

$$10 \text{ minutes} \rightarrow 10 \text{ litres} \times 10 \text{ litres} \\ = 100 \text{ litres}$$

Step 3 : Find the capacity of the tank

$$40\% \rightarrow 100 \text{ litres}$$

$$100\% \rightarrow \frac{100}{40} \times 100 \text{ litres} \\ = 250 \text{ litres}$$

(a) The capacity of the tank was 250 litres.

Step 4 : Find how long more it would take to fill the tank

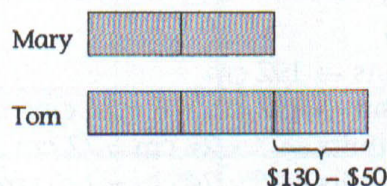
$$100 \text{ litres} \rightarrow 10 \text{ minutes}$$

$$150 \text{ litres} \rightarrow \frac{150}{100} \times 10 \text{ minutes} \\ = 15 \text{ minutes}$$

(b) It would take 15 minutes more before the tank is completely filled with water.

Answers: (a) 250 litres
(b) 15 minutes

Step 1 : Draw a model



Step 2 : Find how much more money Tom had than Mary

$$\$130 - \$50 = \$80$$

Step 3 : Find the amount of money Mary had in the end

$$2 \text{ units} \rightarrow 2 \times \$80 = \$160$$

Step 4 : Find the total amount of money mother gave them in the two days

$$\$160 - \$50 = \$110$$

$$2 \times \$110 = \$220$$

(a) Their mother gave them \$220 altogether.

Step 5 : Find the amount of money mother gave to Mary each day

$$\$110 \div 2 = \$55$$

(b) Their mother gave Mary \$55 each day.

Answers: (a) \$220
(b) \$55

Step 1 : Find the perimeter of square B

A : B

3 : 5

8 units \rightarrow 192 cm

1 unit \rightarrow $192 \text{ cm} \div 8 = 24 \text{ cm}$

A: 3 units $\rightarrow 3 \times 24 \text{ cm} = 72 \text{ cm}$

B: 5 units $\rightarrow 5 \times 24 \text{ cm} = 120 \text{ cm}$

Step 2 : Find the lengths of squares A and B

Length of square A = $72 \text{ cm} \div 4 = 18 \text{ cm}$

Length of square B = $120 \text{ cm} \div 4 = 30 \text{ cm}$

Step 3 : Find the perimeter of the shaded rectangle

shaded rectangle : A

2 : 6

6 units \rightarrow 72 cm

1 unit \rightarrow $72 \text{ cm} \div 6 = 12 \text{ cm}$

2 units $\rightarrow 2 \times 12 \text{ cm} = 24 \text{ cm}$

Step 4 : Find the area of the shaded rectangle

Length of the shaded rectangle

= $18 \text{ cm} \div 2$

= 9 cm

Breadth of the shaded rectangle

= $(24 \text{ cm} - 9 \text{ cm} - 9 \text{ cm}) \div 2$

= 3 cm

Area of the shaded rectangle

= $9 \text{ cm} \times 3 \text{ cm}$

= 27 cm^2

(a) The area of the shaded rectangle is 27 cm^2 .

Step 5 : Find the area of the unshaded portion of square B

Area of square B

= $30 \text{ cm} \times 30 \text{ cm}$

= 900 cm^2

Area of the unshaded portion

= $900 \text{ cm}^2 - 27 \text{ cm}^2$

= 873 cm^2

(b) The area of the unshaded portion of square B is 873 cm^2 .

Step 6 : Find the area of the unshaded portions of squares A and B

Area of square A = $18 \text{ cm} \times 18 \text{ cm}$

= 324 cm^2

Area of the unshaded portion of square A = $324 \text{ cm}^2 - 27 \text{ cm}^2$
= 297 cm^2

Area of the unshaded portions of squares A and B

= $873 \text{ cm}^2 + 297 \text{ cm}^2$

= 1170 cm^2

(c) The total area of the unshaded portions of square A and square B is 1170 cm^2 .

Answers: (a) 27 cm^2

(b) 873 cm^2

(c) 1170 cm^2

Step 1 : Find the area of the 2 quadrants and the rectangle

Small quadrant

= $\frac{1}{4} \times 3.14 \times 12 \text{ cm} \times 12 \text{ cm}$

= 113.04 cm^2

Big quadrant

= $\frac{1}{4} \times 3.14 \times 24 \text{ cm} \times 24 \text{ cm}$

= 452.16 cm^2

Rectangle = $12 \text{ cm} \times 24 \text{ cm}$

= 288 cm^2

Step 2 : Find the difference in area between the big and small quadrants

$452.16 \text{ cm}^2 - 113.04 \text{ cm}^2 = 339.12 \text{ cm}^2$

Step 3 : Find the difference in area between shaded portions, A and B

$339.12 \text{ cm}^2 - 288 \text{ cm}^2 = 51.12 \text{ cm}^2$

The difference in area between shaded portions, A and B is 51.12 cm^2 .

Answer: 51.12 cm^2

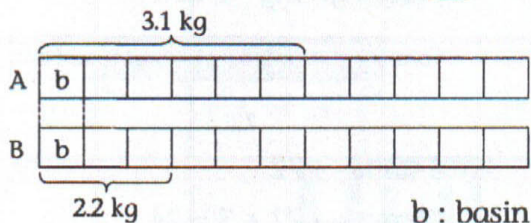
Solution to Question

51

Step 1 : Find the mass of water in basin B

$$\frac{1}{2} = \frac{5}{10}$$

$$\frac{1}{5} = \frac{2}{10}$$



$$3.1 \text{ kg} - 2.2 \text{ kg} = 0.9 \text{ kg}$$

$$3 \text{ units} \rightarrow 0.9 \text{ kg}$$

$$1 \text{ unit} \rightarrow 0.9 \text{ kg} \div 3$$

$$= 0.3 \text{ kg}$$

$$2 \text{ units} \rightarrow 2 \times 0.3 \text{ kg}$$

$$= 0.6 \text{ kg}$$

Step 2 : Find the mass of the basin when it was empty

$$2.2 \text{ kg} - 0.6 \text{ kg} = 1.6 \text{ kg}$$

Step 3 : Find the mass of water in basin C

$$2.8 \text{ kg} - 1.6 \text{ kg} = 1.2 \text{ kg}$$

Step 4 : Find the fraction of water in basin C

$$0.3 \text{ kg} \rightarrow 1 \text{ unit or } \frac{1}{10}$$

$$1.2 \text{ kg} \rightarrow \frac{1.2 \text{ kg}}{0.3 \text{ kg}} = 4 \text{ units or } \frac{4}{10}$$

$$\frac{4}{10} = \frac{2}{5}$$

$\frac{2}{5}$ of basin C was filled with water if it had a mass of 2.8 kg.

Answer: $\frac{2}{5}$

Solution to Question

52

Step 1 : Find the volume of water in the tank

$$1 \text{ unit} \rightarrow 12 \text{ cm}^3$$

$$10 \text{ units} \rightarrow 10 \times 12 \text{ cm}^3$$

$$= 120 \text{ cm}^3$$

Step 2 : Find the capacity of the tank

$$20 \text{ cm} \times 12 \text{ cm} \times 15 \text{ cm} = 3600 \text{ cm}^3$$

Step 3 : Find the volume that was not filled in the tank at first

$$3600 \text{ cm}^3 - 120 \text{ cm}^3 = 3480 \text{ cm}^3$$

Step 4 : Find the fraction of the tank that was not filled with water at first

$$\frac{3480}{3600} = \frac{348}{360} = \frac{29}{30}$$

$\frac{29}{30}$ of the tank was not filled with water at first.

Answer: $\frac{29}{30}$

Solution to Question

53

Step 1 : Find the equivalent fractions of the pens sold on all three days

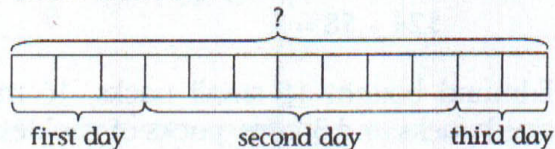
$$\text{First day} \rightarrow \frac{1}{4} = \frac{3}{12}$$

$$\text{Second day} \rightarrow \frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12}$$

$$= \frac{7}{12}$$

$$\text{Third day} \rightarrow \frac{12}{12} - \frac{3}{12} - \frac{7}{12} = \frac{2}{12}$$

Step 2 : Draw a model



Step 3 : Find the total number of pens he had at first

$$7 - 2 = 5 \text{ units}$$

$$5 \text{ units} \rightarrow 15$$

$$1 \text{ unit} \rightarrow 15 \div 5 = 3$$

$$12 \text{ units} \rightarrow 3 \times 12 = 36$$

He had 36 pens at first.

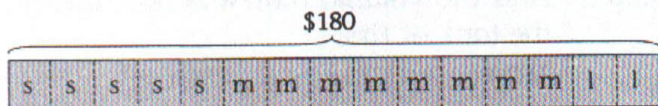
Answer: 36 pens

Step 1 : Find the fraction of small and medium-sized packs of cookies

$$\text{Small : } \frac{1}{3} = \frac{5}{15}$$

$$\text{Medium : } \frac{1}{5} + \frac{5}{15} = \frac{3}{15} + \frac{5}{15} = \frac{8}{15}$$

Step 2 : Draw a model



s : small
m : medium-sized
l : large

Step 3 : Find the value of each unit

$$15 \text{ units} \rightarrow \$180$$

$$1 \text{ unit} \rightarrow \$180 \div 15 = \$12$$

Step 4 : Find the amount of money spent on the cookies

$$\text{Small: } 5 \text{ units} \rightarrow 5 \times \$12 = \$60$$

$$\text{Medium-sized: } 8 \text{ units} \rightarrow 8 \times \$12 = \$96$$

$$\text{Large: } 2 \text{ units} \rightarrow 2 \times \$12 = \$24$$

Step 5 : Find the number of packs of each type that Edmund bought

Number of small packs:

$$\$60 \div \$4 = 15$$

Number of medium-sized packs:

$$\$96 \div \$6 = 16$$

Number of large packs:

$$\$24 \div \$8 = 3$$

Edmund bought 15 small packs, 16 medium-sized packs and 3 large packs of cookies.

Answers: Small: 15

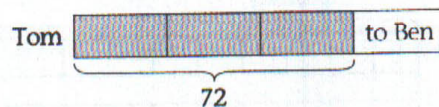
Medium: 16

Large: 3

Step 1 : Find the number of sweets each of them had in the end

$$144 \div 2 = 72$$

Step 2 : Find the number of sweets Tom had before giving to Ben



$$3 \text{ units} \rightarrow 72$$

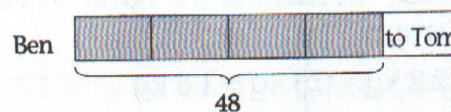
$$1 \text{ unit} \rightarrow 72 \div 3 = 24$$

$$4 \text{ units} \rightarrow 4 \times 24 = 96$$

Step 3 : Find the number of sweets Ben had left after giving some to Tom

$$144 - 96 = 48$$

Step 4 : Find the number of sweets Ben had at first



$$4 \text{ units} \rightarrow 48$$

$$1 \text{ unit} \rightarrow 48 \div 4 = 12$$

$$5 \text{ units} \rightarrow 5 \times 12 = 60$$

Step 5 : Find the number of sweets Tom had at first

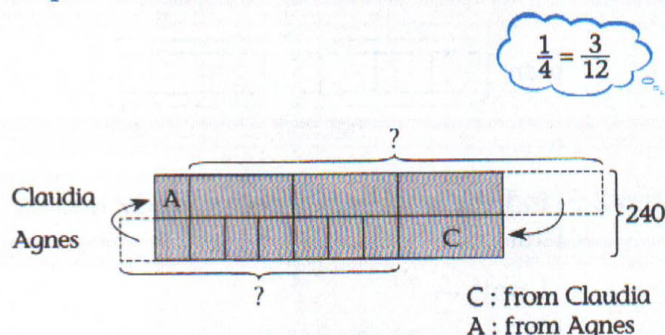
$$144 - 60 = 84$$

Ben had 60 sweets and Tom had 84 sweets at first.

Answers: Ben: 60 sweets

Tom: 84 sweets

Step 1 : Draw a model



Step 2 : Find the value of each unit

$$20 \text{ units} \rightarrow 240$$

$$1 \text{ unit} \rightarrow 240 \div 20 = 12$$

Step 3 : Find the number of curry puffs Claudia had at first

$$12 \text{ units} \rightarrow 12 \times 12 = 144$$

Step 4 : Find the number of curry puffs Agnes had at first

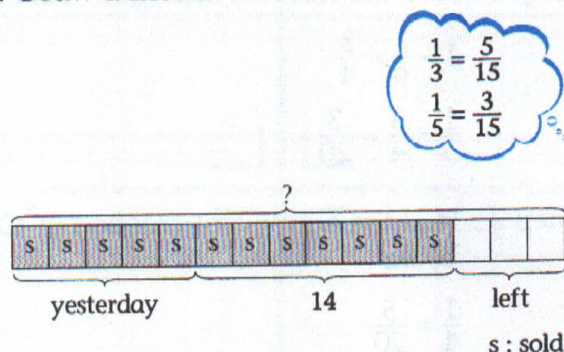
$$8 \text{ units} \rightarrow 8 \times 12 = 96$$

Claudia had 144 curry puffs and Agnes had 96 curry puffs at first.

Answers: Claudia: 144 curry puffs

Agnes: 96 curry puffs

Step 1 : Draw a model



Step 2 : Find the number of roses the florist had at first

$$7 \text{ units} \rightarrow 14$$

$$1 \text{ unit} \rightarrow 14 \div 7 = 2$$

$$15 \text{ units} \rightarrow 15 \times 2 = 30$$

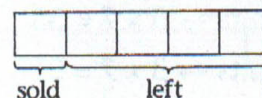
Step 3 : Find the number of roses left after selling $\frac{1}{3}$ of them yesterday

$$10 \text{ units} \rightarrow 10 \times 2 = 20$$

Step 4 : Find the number of orchids left after selling $\frac{1}{5}$ of the orchids

$$60 - 20 = 40$$

Step 5 : Find the number of orchids at first



$$4 \text{ units} \rightarrow 40$$

$$1 \text{ unit} \rightarrow 40 \div 4 = 10$$

$$5 \text{ units} \rightarrow 5 \times 10 = 50$$

Step 6 : Find the total number of orchids and roses at first

$$50 + 30 = 80$$

She had 80 orchids and roses at first.

Answer: 80 orchids and roses

Step 1 : Find the fraction of English books

$$1 - \frac{1}{4} = \frac{3}{4}$$

$$\frac{1}{5} \times \frac{3}{4} = \frac{3}{20}$$

Step 2 : Find the equivalent fraction of Chinese books

$$\frac{1}{4} = \frac{5}{20}$$

Step 3 : Find the fraction of Malay books

$$1 - \left(\frac{3}{20} + \frac{5}{20} \right) = 1 - \frac{8}{20}$$

$$= \frac{12}{20}$$

Step 4 : Find the number of books for each equal part

$$\frac{12}{20} - \frac{3}{20} \rightarrow 63$$

$$\frac{9}{20} (9 \text{ units}) \rightarrow 63$$

$$\frac{1}{20} (1 \text{ unit}) \rightarrow 63 \div 9 = 7$$

Step 5 : Find the number of Chinese, English and Malay books

Chinese: 5 units $\rightarrow 5 \times 7 = 35$

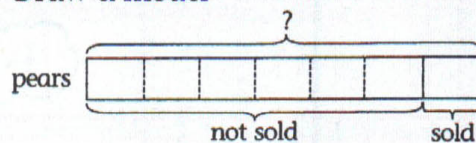
English: 3 units $\rightarrow 3 \times 7 = 21$

Malay: 12 units $\rightarrow 12 \times 7 = 84$

There are 35 Chinese books, 21 English books and 84 Malay books.

Answers: Chinese: 35
English: 21
Malay: 84

Step 1 : Draw a model



Step 2 : Find the number of pears Sandy had at first

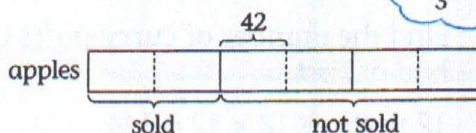
1 unit $\rightarrow 7$

7 units $\rightarrow 7 \times 7 = 49$

Step 3 : Find the number of apples Sandy had at first

6 units $\rightarrow 6 \times 7 = 42$

$\frac{1}{3} = \frac{2}{6}$



$6 \times 42 = 252$

Sandy had 252 apples and 49 pears at first.

Answers: Apples: 252
Pears: 49

Step 1 : Draw a model

$\frac{1}{5} = \frac{2}{10}$

| | | | | | | | | | |
|-----|-----|------|------|------|-----|-----|-----|-----|-----|
| \$2 | \$2 | \$10 | \$10 | \$10 | \$5 | \$5 | \$5 | \$5 | \$5 |
|-----|-----|------|------|------|-----|-----|-----|-----|-----|

Step 2 : Form the total amount in the model as 1 set

$(2 \times \$2) + (3 \times \$10) + (5 \times \$5) = \59

$\$295 \div \$59 = 5 \text{ sets}$

1 set $\rightarrow 3$ (ten-dollar notes)

5 sets $\rightarrow 5 \times 3$
 $= 15$ (ten-dollar notes)

He has 15 ten-dollar notes.

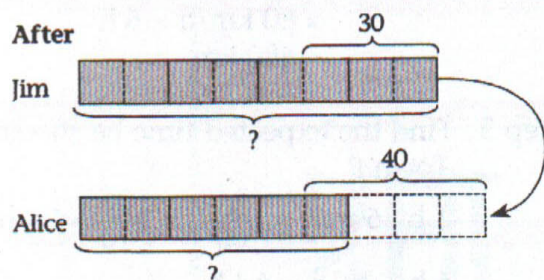
Answer: 15 ten-dollar notes

Step 1 : Draw a model

Before



After



Step 2 : Find the value of each unit

$$3 \text{ units} \rightarrow 30$$

$$1 \text{ unit} \rightarrow 30 \div 3$$

$$= 10$$

Step 3 : Find the number of marbles Alice and Jim had at first

$$\text{Jim: } 8 \text{ units} \rightarrow 8 \times 10 = 80$$

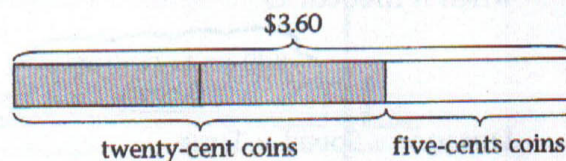
$$\text{Alice: } 6 \text{ units} \rightarrow 6 \times 10 = 60$$

Jim had 80 marbles and Alice had 60 marbles at first.

Answers: Jim: 80 marbles

Alice: 60 marbles

Step 1 : Draw a model



Note:

1. Based on the model, the number of twenty-cent coins is represented by 2 parts. The total number of twenty-cent coins must be an even number.
2. Since the total amount of money (\$3.60 = 360¢) was a multiple of 10, he could only have an even number of five-cent coins.
3. The number of 20¢ coins is twice the number of 5¢ coins.

Step 2 : Use 'Guess and Check' method

| Number of twenty-cent coins | Number of five-cent coins | Total amount | Check |
|-----------------------------|---------------------------|---|-------|
| 12 | 6 | $(12 \times 20¢) + (6 \times 5¢)$ $= \$2.70$ | × |
| 16 | 8 | $(16 \times 20¢) + (8 \times 5¢)$ $= \$3.60$ | ✓ |

He had 16 twenty-cent coins and 8 five-cent coins.

Answers: twenty-cent coins: 16

five-cent coins: 8

Step 1 : Find the distance travelled by car P when it met car Q

8.30 am to 11.30 am
= 3 hours

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 60 \text{ km/h} \times 3 \text{ h} \\ &= 180 \text{ km}\end{aligned}$$

Step 2 : Find the distance car Q had travelled when it met car P

$$300 \text{ km} - 180 \text{ km} = 120 \text{ km}$$

Step 3 : Find the speed of car Q

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{120 \text{ km}}{3 \text{ h}} \\ &= 40 \text{ km/h}\end{aligned}$$

Step 4 : Find how much further car Q had to travel from the meeting with car P before meeting with car R

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 40 \text{ km/h} \times 0.5 \text{ h} \\ &= 20 \text{ km}\end{aligned}$$

Car Q had to travel 20 km from the meeting with car P before meeting with car R.

Answer: 20 km

Step 1 : Find the average speed that Linda was travelling

12 noon to 4 pm
= 4 hours

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 224 \text{ km} \div 4 \text{ h} \\ &= 56 \text{ km/h}\end{aligned}$$

Step 2 : Find the speed that Terence was travelling

$$56 \text{ km/h} + 15 \text{ km/h} = 71 \text{ km/h}$$

Step 3 : Find the distance between town A and town B

$$71 \text{ km/h} \times 4 \text{ h} = 284 \text{ km}$$

The distance between town A and town B was 284 km.

Answer: 284 km

Step 1 : Find the number of hours Aaron took to travel from his home to Town P

$$11 \text{ 30 h} - 05 \text{ 30 h} = 6 \text{ h}$$

Step 2 : Find the distance from his home to Town P

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 80 \text{ km/h} \times 6 \text{ h} \\ &= 480 \text{ km}\end{aligned}$$

Step 3 : Find the expected time he should reach Town P

$$\begin{aligned}1 \text{ h } 36 \text{ min} &= 1 \frac{36}{60} \text{ h} = 1 \frac{6}{10} = 1.6 \text{ h} \\ 6 \text{ h} - 1.6 \text{ h} &= 4.4 \text{ h}\end{aligned}$$

Step 4 : Find the time taken if Aaron were to travel at 100 km/h for half of his journey

$$\begin{aligned}\text{Time} &= \text{Distance} \div \text{Speed} \\ &= (480 \div 2) \text{ km} \div 100 \text{ km/h} \\ &= 240 \text{ km} \div 100 \text{ km/h} \\ &= 2.4 \text{ h}\end{aligned}$$

Step 5 : Find the remaining hours needed for the second half of his journey

$$4.4 \text{ h} - 2.4 \text{ h} = 2 \text{ h}$$

Step 6 : Find the expected speed that Aaron had to travel in order to be on time

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 240 \text{ km} \div 2 \text{ h} \\ &= 120 \text{ km/h}\end{aligned}$$

His speed for the second half of his journey should be 120 km/h in order to be on time.

Answer: 120 km/h

Step 1 : Find the total number of hours Tony took to reach point B

The time when Tony set off:

$$8.30 \text{ am} - 2 \text{ hours} = 6.30 \text{ am}$$

The time when Tony reached point B:

10.30 am

The total number of hours Tony took to travel to point B:

$$6.30 \text{ am to } 10.30 \text{ am} = 4 \text{ hours}$$

Step 2 : Find the speed at which Tony travelled from point A to point B

$$90 \text{ km/h} - 10 \text{ km/h} = 80 \text{ km/h}$$

Step 3 : Find the distance from point A to B

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 80 \text{ km/h} \times 4 \text{ h} \\ &= 320 \text{ km} \end{aligned}$$

Step 4 : Find the distance Jasper had travelled in 2 hours

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 90 \text{ km/h} \times 2 \text{ h} \\ &= 180 \text{ km} \end{aligned}$$

Step 5 : Find how far Jasper was from point B when Tony reached there

$$320 \text{ km} - 180 \text{ km} = 140 \text{ km}$$

Jasper was 140 km away from point B when Tony reached point B.

Answer: 140 km

Step 1 : Find the distance covered by George from 4.15 to 5.45 pm

$$\begin{aligned} 4.15 \text{ pm to } 5.45 \text{ pm} &= 1 \text{ h } 30 \text{ mins} \\ &= 1.5 \text{ h} \end{aligned}$$

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 9 \text{ km/h} \times 1.5 \text{ h} \\ &= 13.5 \text{ km} \end{aligned}$$

Step 2 : Find the distance covered by Caleb from 4.45 pm – 5.45 pm

$$13.5 \text{ km} + 2 \text{ km} = 15.5 \text{ km}$$

Step 3 : Find Caleb's jogging speed

$$\begin{aligned} \text{Speed} &= \text{Distance} \div \text{Time} \\ &= 15.5 \text{ km} \div 1 \text{ h} \\ &= 15.5 \text{ km/h} \end{aligned}$$

Step 4 : Find the distance covered by Caleb if he had started jogging at the same time as George

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 15.5 \text{ km/h} \times 1.5 \text{ h} \\ &= 23.25 \text{ km} \end{aligned}$$

Caleb would have run 23.25 km if he had started jogging at the same time as George.

Answer: 23.25 km

Step 1 : Find the distance between town A and town B

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 90 \text{ km/h} \times 5 \text{ h} \\ &= 450 \text{ km}\end{aligned}$$

Step 2 : Find the original speed of the bus

$$450 \text{ km} \div 9 \text{ h} = 50 \text{ km/h}$$

Step 3 : Find the time taken by the bus after travelling $\frac{3}{5}$ of its journey

$$\begin{aligned}\frac{3}{5} \times 450 \text{ km} &= 270 \text{ km} \\ 270 \text{ km} \div 50 \text{ km/h} &= 5.4 \text{ h}\end{aligned}$$

Step 4 : Find the remaining time if the bus must reach town B by 1 hour 36 minutes earlier

$$\begin{aligned}1 \text{ h } 36 \text{ mins} &= 1.6 \text{ h} \\ 9 \text{ h} - 1.6 \text{ h} &= 7.4 \text{ h} \\ 7.4 \text{ h} - 5.4 \text{ h} &= 2 \text{ h}\end{aligned}$$

Step 5 : Find the speed that the bus need to travel for the remaining $\frac{2}{5}$ of the journey

$$\begin{aligned}\frac{2}{5} \times 450 \text{ km} &= 180 \text{ km} \\ 180 \text{ km} \div 2 \text{ h} &= 90 \text{ km/h}\end{aligned}$$

Step 6 : Find how much faster the bus had to travel

$$90 \text{ km/h} - 50 \text{ km/h} = 40 \text{ km/h}$$

The bus need to travel 40 km/h faster.

Answer: 40 km/h

Step 1 : Find the distance Bryan covered before being overtaken by Aaron

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 2 \text{ min} \times 120 \text{ m/min} \\ &= 240 \text{ m}\end{aligned}$$

Step 2 : Find the distance that Aaron had to cover to overtake Bryan

$$50 \text{ m} + 240 \text{ m} = 290 \text{ m}$$

Step 3 : Find Aaron's speed

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 290 \text{ m} \div 2 \text{ min} \\ &= 145 \text{ m/min}\end{aligned}$$

Step 4 : Find the distance Aaron had to run to catch up with Collin

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 145 \text{ m/min} \times 5 \text{ min} \\ &= 725 \text{ m}\end{aligned}$$

Step 5 : Find the distance Collin ran before being overtaken by Aaron

$$725 \text{ m} - 150 \text{ m} - 50 \text{ m} = 525 \text{ m}$$

Step 6 : Find Collin's speed

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 525 \text{ m} \div 5 \text{ min} \\ &= 105 \text{ m/min}\end{aligned}$$

Step 7 : Find the difference between Bryan and Collin's speed

$$120 \text{ m/min} - 105 \text{ m/min} = 15 \text{ m/min}$$

Step 8 : Find the time taken for Bryan to overtake Collin

$$\begin{aligned}\text{Time} &= \text{Distance} \div \text{Speed} \\ 150 \text{ m} \div 15 \text{ m/min} &= 10 \text{ min} \\ 10 \text{ min after } 8 \text{ am} &= 8.10 \text{ am}\end{aligned}$$

Bryan overtook Collin at 8.10 am.

Answer: 8.10 am

Step 1 : Find the time taken by Sean to reach his destination

$$5.30 \text{ am to } 1.30 \text{ pm} = 8 \text{ hours}$$

Step 2 : Find the distance Sean had travelled

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 90 \text{ km/h} \times 8 \text{ h} \\ &= 720 \text{ km}\end{aligned}$$

Step 3 : Find Mary's speed

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 720 \text{ km} \div 6 \text{ h} \\ &= 120 \text{ km/h}\end{aligned}$$

Step 4 : Find the difference in their speed

$$120 \text{ km/h} - 90 \text{ km/h} = 30 \text{ km/h}$$

Step 5 : Find how long Sean had travelled when he was 150 km apart from Mary

$$\begin{aligned}\text{Time} &= \text{Distance} \div \text{Speed} \\ &= 150 \text{ km} \div 30 \text{ km/h} \\ &= 5 \text{ h}\end{aligned}$$

$$8 \text{ h} - 5 \text{ h} = 3 \text{ h}$$

Step 6 : Find the distance Sean was away from his destination

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 90 \text{ km/h} \times 3 \text{ h} \\ &= 270 \text{ km}\end{aligned}$$

Sean was 270 km away from his destination when he was 150 km apart from Mary.

Answer: 270 km

Step 1 : Find the distance between the two towns

$$11 \text{ am to } 4 \text{ pm} = 5 \text{ h}$$

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 120 \text{ km/h} \times 5 \text{ h} \\ &= 600 \text{ km}\end{aligned}$$

Step 2 : Find the distance Jane was away from town Q when she passed Mark

$$1 - \frac{2}{5} = \frac{3}{5}$$

$$\begin{aligned}\frac{2}{5} \text{ journey} \\ &= 600 \text{ km} - 360 \text{ km} \\ &= 240 \text{ km}\end{aligned}$$

$$\frac{5}{5} (5 \text{ units}) \rightarrow 600 \text{ km}$$

$$\frac{1}{5} (1 \text{ unit}) \rightarrow 600 \text{ km} \div 5 = 120 \text{ km}$$

$$\frac{3}{5} (3 \text{ units}) \rightarrow 3 \times 120 \text{ km} = 360 \text{ km}$$

(a) Jane was 360 km away from town Q when she passed Mark.

Step 3: Find the time taken by Jane for the first $\frac{2}{5}$ of the journey

$$\begin{aligned}\text{Time} &= \text{Distance} \div \text{Speed} \\ &= 240 \text{ km} \div 120 \text{ km/h} \\ &= 2 \text{ hours}\end{aligned}$$

They met at 1 pm.

Step 4 : Find how fast Mark should travel to reach town Q at 3.30 pm

$$1 \text{ pm} - 3.30 \text{ pm} \rightarrow 2.5 \text{ hours}$$

$$\begin{aligned}\text{Speed} &= \text{Distance} \div \text{Time} \\ &= 360 \text{ km} \div 2.5 \text{ hours} \\ &= 144 \text{ km/h}\end{aligned}$$

(b) He should travel at 144 km/h if he wanted to arrive town Q at 3.30 pm.

Answers: (a) 360 km

(b) 144 km/h

Step 1 : Find the volume of water needed to fill the container completely

$$\frac{4}{5} \times 15 \text{ cm} \times 20 \text{ cm} \times 30 \text{ cm} = 7200 \text{ cm}^3$$

Step 2 : Find the volume of water flowing from the two taps in one minute

$$120 \text{ ml} + 180 \text{ ml} = 300 \text{ ml}$$

$$300 \text{ ml} = 300 \text{ cm}^3$$

Step 3 : Find the time needed to fill the container

$$\frac{7200 \text{ cm}^3}{300 \text{ cm}^3} \times 1 \text{ min} = 24 \text{ min}$$

Step 4 : Find how much faster it would take to fill the container if the water flowed from each tap at 200 cm³ per minute

$$200 \text{ cm}^3 + 200 \text{ cm}^3 = 400 \text{ cm}^3$$

$$400 \text{ cm}^3 = 1 \text{ minute}$$

$$7200 \text{ cm}^3 = \frac{7200 \text{ cm}^3}{400 \text{ cm}^3} \times 1 \text{ min} \\ = 18 \text{ minutes}$$

$$24 \text{ minutes} - 18 \text{ minutes} = 6 \text{ minutes}$$

It would be 6 minutes faster to fill the container if the water flowed from each tap at a rate of 200 ml/min.

Answer: 6 minutes

Step 1 : Find the distance between point P and Q

$$\begin{array}{l} 9 \text{ am to } 1 \text{ pm} \\ = 4 \text{ hours} \end{array}$$

$$\begin{array}{l} \text{Distance} = \text{Speed} \times \text{Time} \\ = 90 \text{ km/h} \times 4 \text{ h} \\ = 360 \text{ km} \end{array}$$

Step 2 : Find the distance travelled by the car when it passed the lorry

If the lorry had travelled $\frac{1}{4}$ of the distance from Q, the car must have travelled $\frac{3}{4}$ of the distance from P.

$$\frac{3}{4} \times 360 \text{ km} = 270 \text{ km}$$

(a) The distance travelled by the car when it passed the lorry was 270 km.

Step 3 : Find the time taken by the car to travel 270 km

$$\begin{array}{l} \text{Time} = \text{Distance} \div \text{Speed} \\ = 270 \text{ km} \div 90 \text{ km/h} \\ = 3 \text{ h} \end{array}$$

Step 4 : Find the time taken by the lorry to travel from point Q to P

$$3 \text{ h} - 1 \text{ h} = 2 \text{ h}$$

$$\begin{array}{l} \text{Speed of lorry} = \text{Distance} \div \text{Time} \\ = \frac{360 \text{ km} - 270 \text{ km}}{2 \text{ h}} \\ = 45 \text{ km/h} \end{array}$$

$$\begin{array}{l} \text{Time} = \text{Distance} \div \text{Speed} \\ = 360 \text{ km} \div 45 \text{ km/h} \\ = 8 \text{ h} \end{array}$$

(b) The total time taken by the lorry to travel from point Q to point P was 8 hours.

Answers: (a) 270 km

(b) 8 hours

Step 1 : Find the distance travelled by Jack for the first $\frac{5}{9}$ of his journey

$$\frac{4}{9} (4 \text{ units}) \rightarrow 24 \text{ km}$$

$$\frac{1}{9} (1 \text{ unit}) \rightarrow 24 \text{ km} \div 4 = 6 \text{ km}$$

$$\frac{5}{9} (5 \text{ units}) \rightarrow 5 \times 6 \text{ km} = 30 \text{ km}$$

Step 2 : Find the time Jack took to complete the whole journey

$$\begin{aligned} \text{Time} &= \text{Distance} \div \text{Speed} \\ &= 30 \text{ km} \div 80 \text{ km/h} \\ &= 0.375 \text{ h} \end{aligned}$$

$$0.375 \text{ h} \times 60 \text{ minutes} = 22.5 \text{ min}$$

$$22.5 \text{ min} + 12 \text{ min} = 34.5 \text{ min}$$

(a) He took 34.5 minutes to complete the whole journey.

Step 3 : Find the speed for the second part of his journey

$$\begin{aligned} 60 \text{ min} &= 1 \text{ h} \\ 12 \text{ min} &= 0.2 \text{ h} \end{aligned}$$

$$\begin{aligned} \text{Speed} &= \text{Distance} \div \text{Time} \\ &= 24 \text{ km} \div 0.2 \text{ h} \\ &= 120 \text{ km/h} \end{aligned}$$

(b) His speed for the second part of his journey was 120 km/h.

Answers: (a) 34.5 minutes

(b) 120 km/h

Step 1 : Find the number of hours Jane had travelled when she overtook Tom

$$1 - \frac{3}{5} = \frac{2}{5}$$

$$\frac{2}{5} (2 \text{ units}) \rightarrow 4 \text{ h}$$

$$\frac{1}{5} (1 \text{ unit}) \rightarrow 4 \text{ h} \div 2 = 2 \text{ h}$$

$$\frac{3}{5} (3 \text{ units}) \rightarrow 3 \times 2 \text{ h} = 6 \text{ h}$$

Step 2 : Find the distance that Jane travelled before overtaking Tom

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 100 \text{ km/h} \times 6 \text{ h} \\ &= 600 \text{ km} \end{aligned}$$

Step 3 : Find the distance between point A and point B

$$\frac{3}{5} (3 \text{ units}) \rightarrow 600 \text{ km}$$

$$\frac{1}{5} (1 \text{ unit}) \rightarrow 600 \text{ km} \div 3 = 200 \text{ km}$$

$$\frac{5}{5} (5 \text{ units}) \rightarrow 5 \times 200 \text{ km} = 1000 \text{ km}$$

Step 4 : Find the distance that Tom was from point B when Jane overtook him

$$1000 \text{ km} - 600 \text{ km} = 400 \text{ km}$$

(a) Tom was 400 km away from point B when Jane overtook him.

Step 5 : Find Tom's average speed

$$\begin{aligned} 6 \text{ h} + 2 \text{ h} &= 8 \text{ h} \\ \text{Speed} &= \text{Distance} \div \text{Time} \\ &= 600 \text{ km} \div 8 \text{ h} \\ &= 75 \text{ km/h} \end{aligned}$$

(b) Tom's average speed was 75 km/h.

Step 6 : Find the time Tom reached point B

$$\begin{aligned} \text{Time} &= \text{Distance} \div \text{Speed} \\ &= 1000 \text{ km} \div 75 \text{ km/h} \\ &= 13\frac{1}{3} \text{ h} \end{aligned}$$

$$13\frac{1}{3} \text{ h} = 13 \text{ h } 20 \text{ mins}$$

$$\begin{aligned} 13 \text{ h } 20 \text{ min} + 05 \text{ h } 45 \text{ min} &= 19 \text{ h } 05 \text{ min} \\ 19 \text{ h } 05 \text{ min} &\rightarrow 7.05 \text{ pm} \end{aligned}$$

(c) Tom reached point B at 7.05 pm.

Answers: (a) 400 km

(b) 75 km/h

(c) 7.05 pm

Step 1 : Find the number of hours motorist A travelled

$$9.30 \text{ am to } 3.30 \text{ pm} = 6 \text{ hours}$$

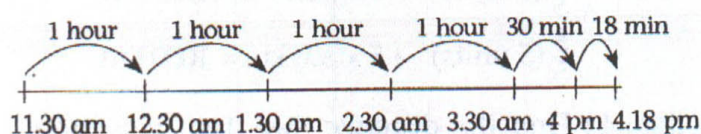
Step 2 : Find the distance between towns P and Q

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 80 \text{ km/h} \times 6 \text{ h} \\ &= 480 \text{ km} \end{aligned}$$

Step 3 : Find the time taken by motorist B to reach town Q

$$\begin{aligned} \text{Time} &= \text{Distance} \div \text{Speed} \\ &= 480 \text{ km} \div 100 \text{ km/h} \\ &= 4.8 \text{ h} \\ &= 4 \text{ h } 48 \text{ mins} \end{aligned}$$

Step 4 : Use a timeline to calculate the time motorist B arrived at town Q



(a) Motorist B arrived at town Q at 4.18 pm.

Step 5 : Find the speed of motorist B

From the timeline, it would take motorist B 4 hours to arrive at town Q at 3.30 pm

$$\begin{aligned} \text{Speed} &= \text{Distance} \div \text{Time} \\ &= 480 \text{ km} \div 4 \text{ h} \\ &= 120 \text{ km/h} \end{aligned}$$

(b) Motorist B would have to travel at 120 km/h if he wanted to reach town Q at the same time as motorist A.

Answers: (a) 4.18 pm

(b) 120 km/h

Step 1 : Find the speed of train B

2 pm to 4 pm
= 2 hours

$$\begin{aligned} \text{Speed} &= \text{Distance} \div \text{Time} \\ &= 400 \text{ km} \div 2 \text{ h} \\ &= 200 \text{ km/h} \end{aligned}$$

Step 2 : Find the time taken by train B from X to Y

$$6 \text{ h} - 2 \text{ h} = 4 \text{ h}$$

Step 3 : Find the distance from town X to Y

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 200 \text{ km/h} \times 4 \text{ h} \\ &= 800 \text{ km} \end{aligned}$$

Step 4 : Find the time taken by train A to travel from town X to Y

$$\begin{aligned} \text{Time} &= \text{Distance} \div \text{Speed} \\ &= 800 \text{ km} \div 160 \text{ km/h} \\ &= 5 \text{ h} \end{aligned}$$

Step 5 : Find the time train A left town X

$$5 \text{ hours before } 2 \text{ pm} \rightarrow 9 \text{ am}$$

(a) Train A left town X at 9 am.

Step 6 : Find the total time taken by train A to travel from town X to Z

$$\begin{aligned} \text{Time} &= \text{Distance} \div \text{Speed} \\ &= (400 \text{ km} + 800 \text{ km}) \div 160 \text{ km/h} \\ &= 7.5 \text{ h or } 7\frac{1}{2} \text{ h} \end{aligned}$$

Step 7 : Find the time train A reached town Z

$$\begin{aligned} 09 \text{ 00 h} + 7 \text{ h } 30 \text{ mins} &= 16 \text{ 30 h} \\ &= 4.30 \text{ pm} \end{aligned}$$

(b) Train A reached town Z at 4.30 pm.

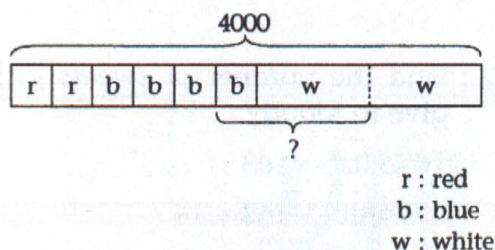
Answers: (a) 9 am

(b) 4.30 pm

Step 1: Form the ratio for the blue and red towels

$$\begin{array}{l} \text{blue : red} \\ 2 : 1 \\ \times 2 \quad \quad \times 2 \\ \hline 4 : 2 \end{array}$$

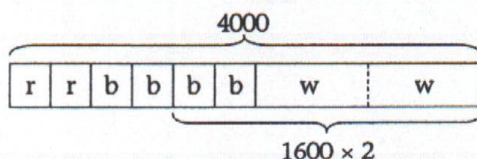
Step 2: Draw a model



Step 3: Find the number of towels sold

$$4000 - 2400 = 1600$$

Step 4: Find the number of red and white towels



$$\text{blue (2 units) = red (2 units)}$$

$$\text{red and white towels} \rightarrow 1600 \times 2 = 3200$$

There were 3200 red and white towels at first.

Answer: 3200 red and white towels

Step 1: Use the lowest common multiple of 2 and 3 to make the ratio of beads in jar B common

$$\begin{array}{l} \text{A : B : C} \\ 2 : 3 : \\ \times 2 \quad \quad \times 3 \\ \hline 4 : 6 : 3 \\ \times 3 \quad \quad \times 3 \\ \hline 12 : 18 : 9 \end{array}$$

Step 2: Form the new ratio when B gives 2 units to A and C

$$\begin{array}{l} \text{A : B : C} \\ 12 : 18 : 9 \\ +2 \quad \quad -4 \quad \quad +2 \\ \hline 14 : 14 : 11 \end{array}$$

Step 3: Find the total number of beads in the three jars

$$\text{C: 11 units} \rightarrow 297$$

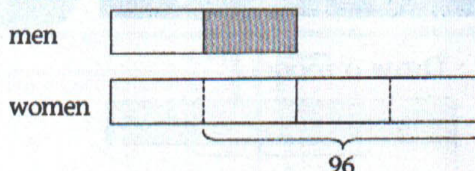
$$1 \text{ unit} \rightarrow 27$$

$$39 \text{ units} \rightarrow 39 \times 27 = 1053$$

The total number of beads in the three jars is 1053.

Answer: 1053 beads

Step 1: Draw a model



Step 2: Find the number of women who remain at the party

$$3 \text{ units} \rightarrow 96$$

$$1 \text{ unit} \rightarrow 96 \div 3 = 32$$

$$4 \text{ units} \rightarrow 4 \times 32 = 128$$

$$128 - 8 = 120$$

Step 3: Find the ratio of the number of men to the number of women who remain at the party

$$\text{men : women}$$

$$32 : 120$$

$$16 : 60$$

$$4 : 15$$

The ratio of the number of men to the number of women who remain at the party is 4 : 15.

Answer: 4 : 15

Solution to Question

81

Step 1 : Find the number of marbles Mark and Cindy each had

$$3 \text{ units} + 2 \text{ units} \rightarrow 80$$

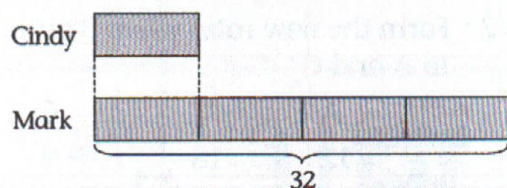
$$5 \text{ units} \rightarrow 80$$

$$1 \text{ unit} \rightarrow 80 \div 5 = 16$$

$$\text{Mark: } 2 \text{ units} \rightarrow 2 \times 16 = 32$$

$$\text{Cindy: } 3 \text{ units} \rightarrow 3 \times 16 = 48$$

Step 2 : Draw a model



Step 3 : Find the number of marbles Cindy had given away

$$4 \text{ units} \rightarrow 32$$

$$1 \text{ unit} \rightarrow 32 \div 4 = 8$$

$$48 - 8 = 40$$

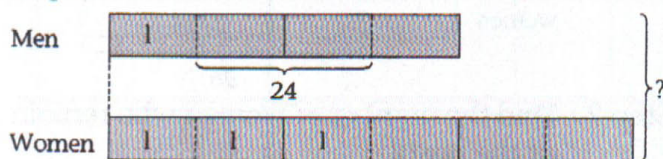
Cindy gave 40 marbles away.

Answer: 40 marbles

Solution to Question

82

Step 1 : Draw a model



1 : left the club

Step 2 : Find the value each unit

$$6 \text{ units} - 4 \text{ units} \rightarrow 24$$

$$2 \text{ units} \rightarrow 24$$

$$1 \text{ unit} \rightarrow 24 \div 2 = 12$$

Step 3 : Find the number of people in the club at first

$$6 \text{ units} + 4 \text{ units} = 10 \text{ units}$$

$$10 \text{ units} \rightarrow 10 \times 12 = 120$$

There were 120 people in the club at first.

Answer: 120 people

Solution to Question

83

Step 1 : Draw a table to compare the ratio

| Mandy | : | Jack | : | total |
|-------|---|------|---|-------|
| 5 | : | 7 | : | 12 |
| 3 | : | 21 | : | 24 |
| 10 | : | 14 | : | 24 |
| 12 | : | 12 | : | 24 |

Annotations: Arrows show adjustments. From 5 to 3: $\times 2$. From 7 to 21: $\times 3$. From 10 to 12: $+2$. From 14 to 12: -2 . From 12 to 24: $\times 2$.

Step 2 : Find the number of sweets Jack must give to Mandy

$$14 \text{ units} \rightarrow 168$$

$$1 \text{ unit} \rightarrow 168 \div 14 = 12$$

Each must have 12 units to have an equal number of sweets

$$12 - 3 = 9 \text{ units}$$

$$9 \text{ units} \rightarrow 9 \times 12 = 108$$

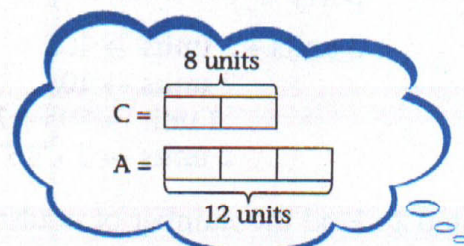
Jack should return 108 sweets to Mandy.

Answer: 108 sweets

Solution to Question

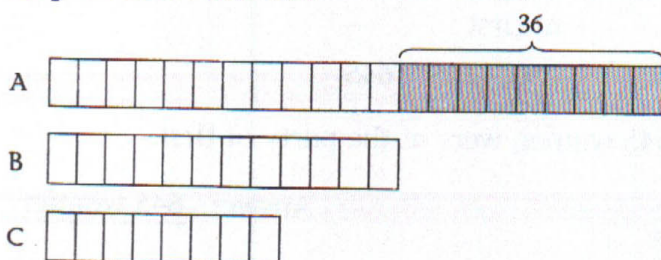
84

Step 1: Compare the ratios of the sweets in containers A, B, C



$$\begin{array}{rcl}
 A : B : C & & \\
 7 : 4 & & \\
 \times 3 & & \times 4 \\
 21 : 12 : 8 & & \\
 \text{after 36 sweets were taken} & & \\
 12 : 12 : 8 & &
 \end{array}$$

Step 2: Draw a model



Step 3: Find the value of each unit

$$9 \text{ units} \rightarrow 36$$

$$1 \text{ unit} \rightarrow 36 \div 9 = 4$$

Step 4: Find the total number of sweets left in the three containers

$$12 \text{ units} + 12 \text{ units} + 8 \text{ units} = 32 \text{ units}$$

$$32 \text{ units} \rightarrow 32 \times 4 = 128$$

The total number of sweets left in the three containers was 128.

Answer: 128 sweets

Solution to Question

85

Step 1: Find the number of adults on the ship at first

$$60\% \times 1580 = 948$$

Step 2: Find the number of adults on the ship in the end

$$\text{Children} \rightarrow 1580 - 948 = 632$$

$$\text{Children on ship (80\%)} \rightarrow 632$$

$$\text{Adults on ship (20\%)} \rightarrow \frac{632}{80} \times 20 = 158$$

Step 3: Find the number of adults who alight from the ship

$$948 - 158 = 790$$

(a) 790 adults alight from the ship.

Step 4: Find the ratio of children to adults who remain on the ship

$$\begin{array}{rcl}
 \text{Children} & : & \text{Adults} \\
 632 & : & 158 \\
 4 & : & 1
 \end{array}$$

(b) The ratio of children to adults who remain on the ship is 4 : 1.

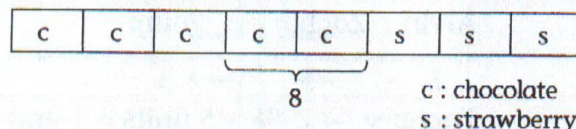
Answers: (a) 790 adults

(b) 4 : 1

Solution to Question

86

Step 1: Draw a model



Step 2: Find the number of chocolate cakes and strawberry cakes

$$2 \text{ units} \rightarrow 8$$

$$1 \text{ unit} \rightarrow 8 \div 2 = 4$$

$$\text{Chocolate cakes: } 5 \text{ units} \rightarrow 5 \times 4 = 20$$

$$\text{Strawberry cakes: } 3 \text{ units} \rightarrow 3 \times 4 = 12$$

Step 3: Find the cost of each strawberry cake

$$2 \times \$4 = \$8$$

$$\$8 + \$3 = \$11$$

Step 4: Find the money collected from the sales of chocolate and strawberry cakes

$$\text{Chocolate cakes: } 20 \times \$4 = \$80$$

$$\text{Strawberry cakes: } 12 \times \$11 = \$132$$

Step 5: Find the money collected by Mrs Gibbs and Mrs Drew from the sales of the cakes

$$\$80 + \$132 = \$212$$

They collected \$212 altogether from the sales of the cakes.

Answer: \$212

Solution to Question

87

Step 1 : Find the total number of charity tickets sold by Mark and Jane

$$5 \text{ units} - 3 \text{ units} \rightarrow 18$$

$$2 \text{ units} \rightarrow 18$$

$$1 \text{ unit} \rightarrow 18 \div 2 = 9$$

$$5 \text{ units} + 3 \text{ units} \rightarrow 8 \text{ units}$$

$$8 \text{ units} \rightarrow 8 \times 9 = 72$$

Step 2 : Find the total number of charity tickets sold by Susan, Mark and Jane

$$2 \times 72 = 144$$

Step 3 : Find the total amount of money they collected

$$144 \times \$1.20 = \$172.80$$

They collected \$172.80 in all.

Answer: \$172.80

Solution to Question

88

Step 1 : Find the ratio of money Alvin, Zachary and Philip had in the end

At first

Alvin : Zachary : Philip

$$2 : 5 : 3$$

$$\text{Zachary} \rightarrow 20\% \times 5 \text{ units} = 1 \text{ unit}$$

In the end

Alvin : Zachary : Philip

$$2 : 4 : 3$$

Step 2 : Find the value of each unit

$$\begin{aligned} \text{Alvin} + \text{Philip} &\rightarrow 2 \text{ units} + 3 \text{ units} \\ &= 5 \text{ units} \end{aligned}$$

$$5 \text{ units} - 4 \text{ units} \rightarrow \$196$$

$$1 \text{ unit} \rightarrow \$196$$

Step 3 : Find how much more Alvin and Zachary had than Philip

$$\text{Alvin} + \text{Zachary} \rightarrow 7 \text{ units}$$

$$7 \text{ units} - 3 \text{ units} = 4 \text{ units}$$

$$4 \text{ units} \rightarrow 4 \times \$196 = \$784$$

Alvin and Zachary had \$784 more than Philip.

Answer: \$784

Solution to Question

89

Step 1 : Find the number of men who left the party

$$2 \text{ units} + 5 \text{ units} \rightarrow 105$$

$$7 \text{ units} \rightarrow 105$$

$$1 \text{ unit} \rightarrow 105 \div 7 = 15$$

$$2 \text{ units} \rightarrow 2 \times 15 = 30$$

Step 2 : Find the number of adults who left the party

$$10\% \rightarrow 30$$

$$100\% \rightarrow 10 \times 30 = 300$$

Step 3 : Find the number of adults at the party

$$40\% \rightarrow 300$$

$$1\% \rightarrow 300 \div 40 = 7.5$$

$$100\% \rightarrow 100 \times 7.5 = 750$$

Step 4 : Find the number of women at the party at first

$$750 - 105 = 645$$

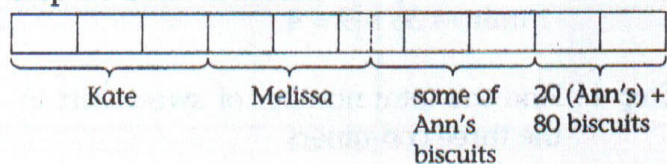
645 women were at the party at first.

Answer: 645 women

Solution to Question

90

Step 1 : Draw a model



Step 2 : Find the total number of biscuits in the jar

$$20\% \rightarrow 20 + 80 = 100$$

$$10\% \rightarrow 100 \div 2 = 50$$

$$100\% \rightarrow 10 \times 50 = 500$$

Step 3 : Find the percentage of biscuits taken by Ann

$$\frac{20}{500} \times 100\% = 4\%$$

$$25\% + 4\% = 29\%$$

Ann took 29% of the biscuits.

Answer: 29%

Solution to Question

91

Step 1 : Find the amount of money Uncle Sam earns from the sale of one cup

$$20\% \times \$8 = \frac{20}{100} \times \$8 = \$1.60$$

Step 2 : Find the extra money Uncle Sam earns for the sale of every 10 cups

$$5\% \times \$8 = \frac{5}{100} \times \$8 = \$0.40$$

Step 3 : Use 'Guess and Check' method to find the number of cups Uncle Sam sells

| Number of cups | Total amount of money |
|----------------|--|
| 20 | $(20 \times \$1.60) + (2 \times \$0.40) = \$32.80$ |
| 40 | $(40 \times \$1.60) + (4 \times \$0.40) = \$65.60$ |
| 50 | $(50 \times \$1.60) + (5 \times \$0.40) = \$82$ |

Step 4 : Find the amount left

$$\$86.80 - \$82 = \$4.80$$

Step 5 : Find the remaining number of cups

$$\$4.80 \div \$1.60 = 3$$

Step 6 : Find the total number of cups Uncle Sam sells

$$50 + 3 = 53$$

He sells 53 cups.

Answer: 53 cups

Solution to Question

93

Step 1 : Find the percentage of red, blue and green marbles

Percentage of remaining marbles:
 $100\% - 40\% = 60\%$

$$\text{red marbles : } \frac{2}{5} \times 100\% = 40\%$$

$$\text{blue marbles : } \frac{10}{100} \times 60\% = 6\%$$

$$\text{green marbles : } \frac{10}{100} \times 60\% = 6\%$$

Step 2 : Find the percentage of yellow marbles

$$40\% + 6\% + 6\% = 52\%$$

$$100\% - 52\% = 48\%$$

Step 3 : Find the total number of blue and green marbles

$$48\% - 40\% \rightarrow 32$$

$$8\% \rightarrow 32$$

$$1\% \rightarrow 32 \div 8$$

$$= 4$$

$$12\% \rightarrow 12 \times 4 = 48$$

$$6\% + 6\% = 12\%$$

The total number of blue and green marbles was 48.

Answer: 48 blue and green marbles

Solution to Question

92

Step 1 : Find the percentage of girls in the class

$$100\% - 20\% = 80\%$$

Step 2 : Find the percentage of girls who do not keep pets

$$100\% - 10\% = 90\%$$

$$\frac{90}{100} \times 80\% = 72\%$$

Step 3 : Find the number of children equivalent to one percent

$$72\% \rightarrow 144$$

$$1\% \rightarrow 144 \div 72 = 2$$

Step 4 : Find the percentage of boys and girls who keep pets

$$\text{Boys : } \frac{20}{100} \times 20\% = 4\%$$

$$\text{Girls : } 80\% - 72\% = 8\%$$

Step 5 : Find the total number of children who keep pets

$$4\% + 8\% = 12\%$$

$$12\% \rightarrow 12 \times 2 = 24$$

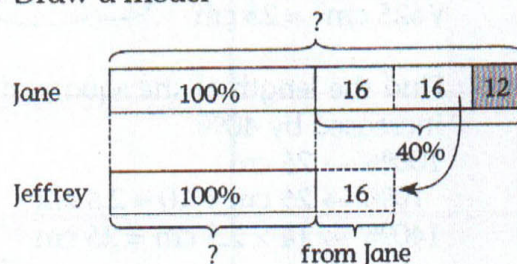
24 children keep pets.

Answer: 24 children

Solution to Question

94

Step 1 : Draw a model



Step 2 : Find the number of marbles each of them had at first

$$40\% \rightarrow 16 + 16 + 12 = 44$$

$$140\% \rightarrow \frac{44}{40} \times 140 = 154$$

$$100\% \rightarrow \frac{44}{40} \times 100 = 110$$

Jane had 154 marbles and Jeffrey had 110 marbles at first.

Answers: Jane: 154 marbles

Jeffrey: 110 marbles

Solution to Question

95

Step 1 : Find the percentage of Mrs Wood's salary that she saved in the second month

$$\frac{50}{100} \times 10\% = 5\%$$

$$10\% + 5\% = 15\%$$

Step 2 : Find Mrs Wood's monthly salary

$$15\% - 10\% \rightarrow \$496.50$$

$$5\% \rightarrow \$496.50$$

$$1\% \rightarrow \$496.50 \div 5$$

$$= \$99.30$$

$$100\% \rightarrow 100 \times \$99.3$$

$$= \$9930$$

Step 3 : Find Mrs Wood's total salary for half a year

$$6 \times \$9930 = \$59\,580$$

Her total salary for half a year is \$59 580.

Answer: \$59 580

Solution to Question

96

Step 1 : Find the length of the square at first.

$$\sqrt{625 \text{ cm}^2} = 25 \text{ cm}$$

$$25 \times 25 = 625$$

Step 2 : Find the length of the square after it is increased by 40%.

$$100\% \rightarrow 25 \text{ cm}$$

$$10\% \rightarrow 25 \text{ cm} \div 10 = 2.5 \text{ cm}$$

$$140\% \rightarrow 14 \times 2.5 \text{ cm} = 35 \text{ cm}$$

Step 3 : Find the area of the square using the new length

$$\text{Area} \rightarrow 35 \text{ cm} \times 35 \text{ cm} = 1225 \text{ cm}^2$$

Step 4 : Find the percentage increase in area

$$1225 \text{ cm}^2 - 625 \text{ cm}^2 = 600 \text{ cm}^2$$

$$\frac{600}{625} \times 100\% = 96\%$$

The percentage increase in area is 96%.

Answer: 96%

Solution to Question

97

Step 1 : Find the percentage of new books

$$100\% - 80\% = 20\%$$

Step 2 : Find the percentage of English books

$$\text{New books: } \frac{10}{100} \times 20\% = 2\%$$

$$\text{Second-hand books: } \frac{60}{100} \times 80\% = 48\%$$

Step 3 : Find the percentage of Chinese books

$$100\% - 2\% - 48\% = 50\%$$

Step 4 : Find the number of English books at first

At first

$$\begin{array}{l} \text{English : Chinese} \\ 2 : 2 \end{array}$$

There are 2 parts of English books at first

After 15 English books are added

English : Chinese

$$3 : 2$$

$$1 \text{ unit} \rightarrow 15$$

$$2 \text{ units} \rightarrow 15 \times 2$$

$$= 30$$

(a) There are 30 English books in the box at first.

Step 5 : Find the total number of books in the box in the end

$$\text{Total} \rightarrow 3 \text{ units} + 2 \text{ units} = 5 \text{ units}$$

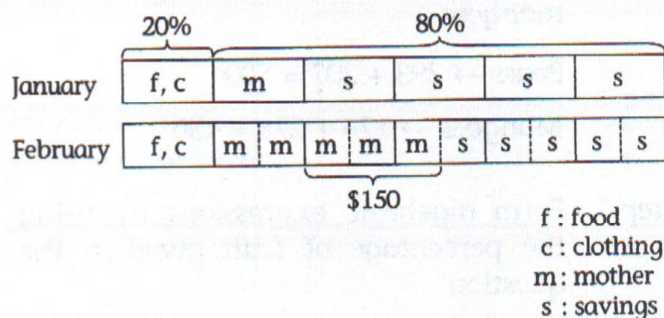
$$5 \text{ units} \rightarrow 5 \times 15 = 75$$

(b) The total number of books in the box in the end is 75.

Answers: (a) 30 English books

(b) 75 books

Step 1 : Draw a model



Step 2 : Find Joyce's salary

$$3 \text{ units} \rightarrow \$150$$

$$1 \text{ unit} \rightarrow \$150 \div 3 = \$50$$

$$10 \text{ units} \rightarrow 10 \times \$50 = \$500$$

$$80\% \rightarrow \$500$$

$$1\% \rightarrow \frac{\$500}{80} = \$6.25$$

$$100\% \rightarrow 100 \times \$6.25 = \$625$$

Step 3 : Find the percentage increase Joyce gave her mother in February

$$\begin{aligned} \text{January} &\rightarrow 2 \times \$50 \\ &= \$100 \end{aligned}$$

$$\begin{aligned} \text{Amount increased} &\rightarrow \$150 - \$100 \\ &= \$50 \end{aligned}$$

$$\begin{aligned} \text{Percentage increased} &\rightarrow \frac{\$50}{\$625} \times 100\% \\ &= 8\% \end{aligned}$$

(a) The percentage increase was 8%.

Step 4 : Find the amount of money she spent on food and clothing in each month

$$80\% \rightarrow \$500$$

$$20\% \rightarrow \frac{500}{80} \times 20 = \$125$$

(b) Joyce spent \$125 on food and clothing in each month.

Answers: (a) 8%

(b) \$125

Step 1 : Find the number of first-class seats in the end

$$10\% \times 4500 = \frac{10}{100} \times 4500 = 450$$

$$450 + 200 = 650$$

(a) There were 650 first-class seats in the end.

Step 2 : Find the number of second-class seats in the end

$$30\% \times 4500 = \frac{30}{100} \times 4500 = 1350$$

$$1350 + 250 = 1600$$

(b) There were 1600 second-class seats in the end.

Step 3 : Find the percentage of third-class seats in the end

$$\begin{aligned} \text{Third-class seats} &\rightarrow 60\% \times 4500 \\ &= \frac{60}{100} \times 4500 \\ &= 2700 \end{aligned}$$

$$\begin{aligned} \text{Total seats} &\rightarrow 4500 + 200 + 250 \\ &= 4950 \end{aligned}$$

$$\frac{2700}{4950} \times 100\% = 54\frac{6}{11}\%$$

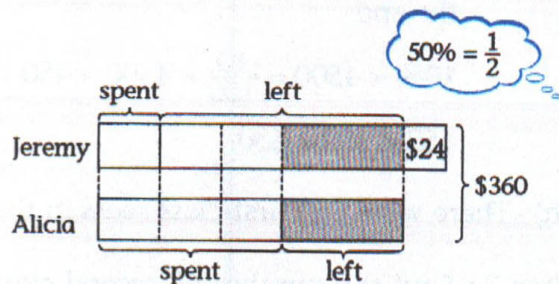
(c) $54\frac{6}{11}\%$ of the seats were third-class in the end.

Answers: (a) 650 first-class seats

(b) 1600 second-class seats

(c) $54\frac{6}{11}\%$

Step 1 : Draw a model



Step 2 : Find out how much Jeremy had at first


$$\$360 - \$24 = \$336$$

$$\$336 \div 2 = \$168$$

$$\$168 + \$24 = \$192$$

(a) Jeremy had \$192 at first.

Step 3 : Find the amount Jeremy had left

 = 2 units + \$24, since the amount Alicia had left was half the amount of what Jeremy had left

$$5 \text{ units} + \$24 \rightarrow \$168$$

$$5 \text{ units} \rightarrow \$168 - \$24 = \$144$$

$$1 \text{ unit} \rightarrow \$144 \div 5 = \$28.80$$

$$4 \text{ units} \rightarrow 4 \times \$28.80 = \$115.20$$

$$\$115.20 + (\$24 \times 2) = \$163.20$$

(b) He had \$163.20 left.

Answers: (a) \$192

(b) \$163.20

Step 1 : Find the total number of pears and mangoes

$$\text{Pears} \rightarrow 293 + 207 = 500$$

$$\text{Mangoes} \rightarrow 176 + 274 = 450$$

Step 2 : Form algebraic expressions by using the percentage of fruit given in the question

| | |
|--------------------|-------------------------|
| 40% in A = 4 units | → total number of pears |
| 70% in B = 7 units | |

A → fruit found in crate A

B → fruit found in crate B

$$4A + 7B = 500$$

| | |
|--------------------|----------------------------|
| 60% in A = 6 units | → total numbers of mangoes |
| 30% in B = 3 units | |

× 3

$$6A + 3B = 450$$

$$12A + 21B = 1500$$

× 2

$$12A + 6B = 900$$

$$21B - 6B = 1500 - 900$$

$$15B = 600$$

$$1B = 40$$

$$3B = 120$$

$$274 - 120 = 154$$

154 mangoes were moved from crate B to crate A.

$$6A = 450 - 120 = 330$$

$$1A = 55$$

$$4A = 220$$

$$220 - 207 = 13$$

13 pears were moved from B to A.

$$\begin{aligned} \text{Total number of fruit moved} &= 154 + 13 \\ &= 167 \end{aligned}$$

Robert moved 167 pieces of fruit from crate B to crate A.

Answer: 167 fruit