

Section I

1. (a) **Required to calculate:** $2\frac{3}{4} \div \frac{5}{8}$

Calculation:

$$\begin{aligned} 2\frac{3}{4} \div \frac{5}{8} &= \frac{(2 \times 4) + 3}{4} \div \frac{5}{8} \\ &= \frac{11}{4} \div \frac{5}{8} \\ &= \frac{11}{4} \times \frac{8}{5} \\ &= \frac{22}{5} \text{ as an improper fraction} \\ &= 4\frac{2}{5} \text{ as a mixed fraction} \end{aligned}$$

- (b) **Required to convert:** $2\frac{7}{8}$ to decimal form, correct to 1 decimal place.

Solution:

Consider the fractional part of $2\frac{7}{8}$ and which is $\frac{7}{8}$.

We convert this fraction to a decimal form,

$$\begin{array}{r} 0.875 \\ 8 \overline{)70} \\ \underline{-64} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

$$\therefore \frac{7}{8} = 0.875 \text{ and so } 2\frac{7}{8} = 2.875.$$

$$\underline{2.875}$$

↑

deciding digit ≥ 5

(So we add 1 to the first digit after the decimal point and ignore all digits to the right of the first decimal place)

Hence, $2\frac{7}{8} \approx 2.9$ (correct to 1 decimal place)

- (c) **Required to express:** 14.995 correct to 2 significant figures.

Solution:

14.995

↑

deciding digit ≥ 5

$\therefore 14.995 \approx 14 + 1$ (and we ignore all digits to the right)

≈ 15 (correct to 2 significant figures)

2. **Data:** In a class of 40 students, 17 students do Science, 15 students do Art and 5 students do both Science and Art.

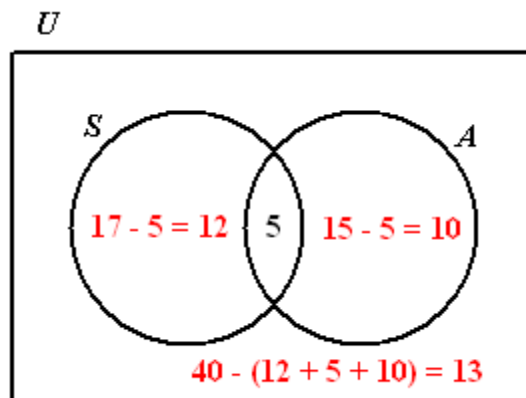
- (a) **Required to complete:** The Venn diagram given.

Solution:

Let

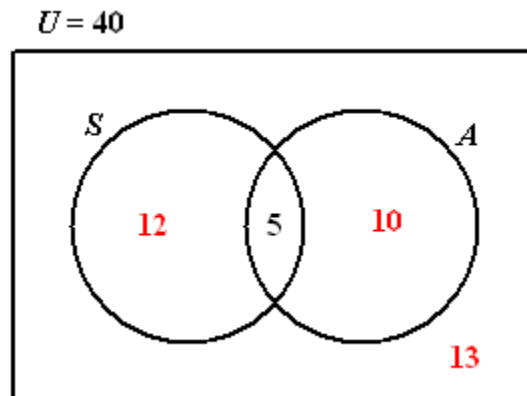
$S = \{\text{Students who do Science}\}$

$A = \{\text{Students who do Art}\}$



- (b) **Required to find:** The number of students doing only one subject.

Solution:



Number of students who do Science only = 12

Number of students who do Art only = 10

Hence, the number of students who study only one of the mentioned subjects (Science or Art) = $12 + 10$
 $= 22$

- (c) **Required to find:** The probability that a student chosen at random does both subjects.

Solution:

$$P(\text{Student does both subjects}) = \frac{\text{No. of students doing both subjects}}{\text{No. of students in the class}}$$

$$= \frac{5}{40}$$

$$= \frac{1}{8}$$

3. (a) (i) **Required to simplify:** $8a - 4b + 5b$

Solution:

$$8a - 4b + 5b = 8a + 5b - 4b$$

$$= 8a + b$$

- (ii) **Required to simplify:** $2x(3x + 5) - 6x^2$

Solution:

$$2x(3x + 5) - 6x^2 = 6x^2 + 10x - 6x^2$$

$$= 6x^2 - 6x^2 + 10x$$

$$= 10x$$

- (b) (i) **Required to factorise:** $2a + 4b$

Solution:

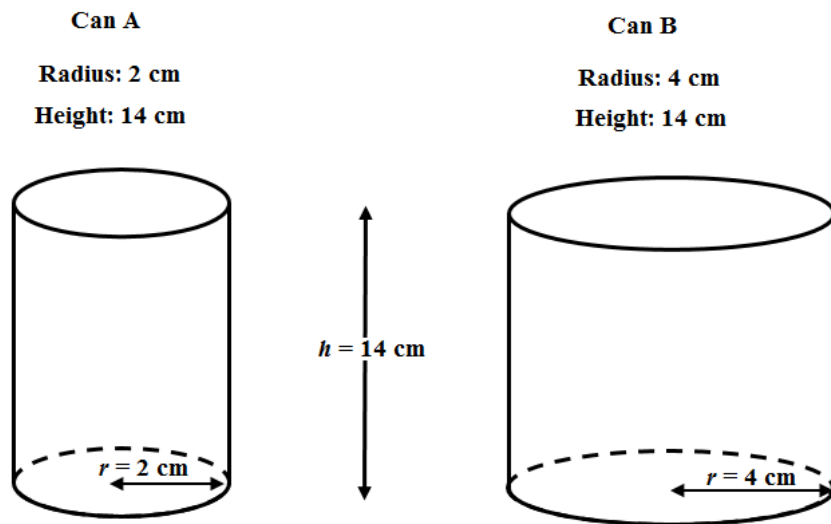
$$\begin{aligned} 2a + 4b &= 2(a) + 2(2b) \\ &= 2(a + 2b) \end{aligned}$$

- (ii) **Required to factorise:** $5ab^2 - 15a^2b^3$

Solution:

$$\begin{aligned} 5ab^2 - 15a^2b^3 &= 5ab^2 \times 1 - 5ab^2 \times 3ab \\ &= 5ab^2(1 - 3ab) \end{aligned}$$

4. **Data:** Diagrams showing the radius and vertical height of Can A and Can B.



- (a) **Required to find:** The volume of Can A, in cm^3 .

Solution:

Can A is a cylinder.

$$V = \pi r^2 h \quad (r = \text{radius}, h = \text{vertical height})$$

$$V = \frac{22}{7} \times 2 \times 2 \times 14 \text{ cm}^3$$

$$V = 176 \text{ cm}^3$$

- (b) **Required to convert:** The volume of Can A from cm^3 to litres.

Solution:

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

$$\therefore 1 \text{ cm}^3 = \frac{1}{1000} \text{ litre}$$

$$\begin{aligned} 176 \text{ cm}^3 &= \frac{1}{1000} \times 176 \text{ litre} \\ &= 0.176 \text{ litre} \end{aligned}$$

- (c) **Required to calculate:** The ratio of the volume of Can A to the volume of Can B.

Calculation:

Volume of Can A : Volume of Can B

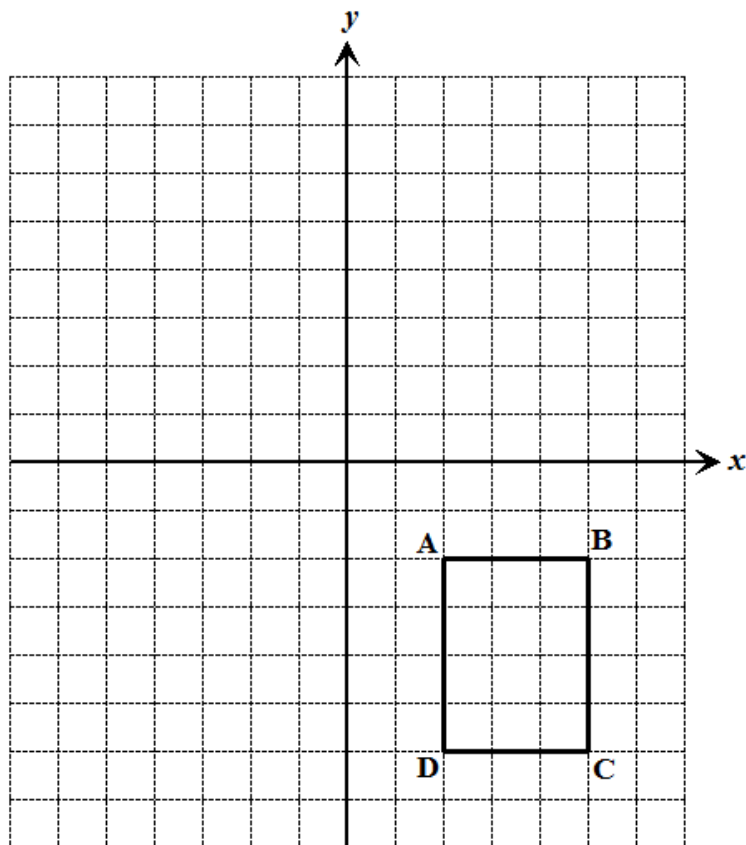
$$\pi(2)^2 \times 14 : \pi(4)^2 \times 14$$

$$2^2 : 4^2$$

$$4 : 16$$

$$1 : 4$$

5. **Data:** Diagram showing quadrilateral $ABCD$. $ABCD$ is reflected in the y – axis to produce image $A'B'C'D'$.

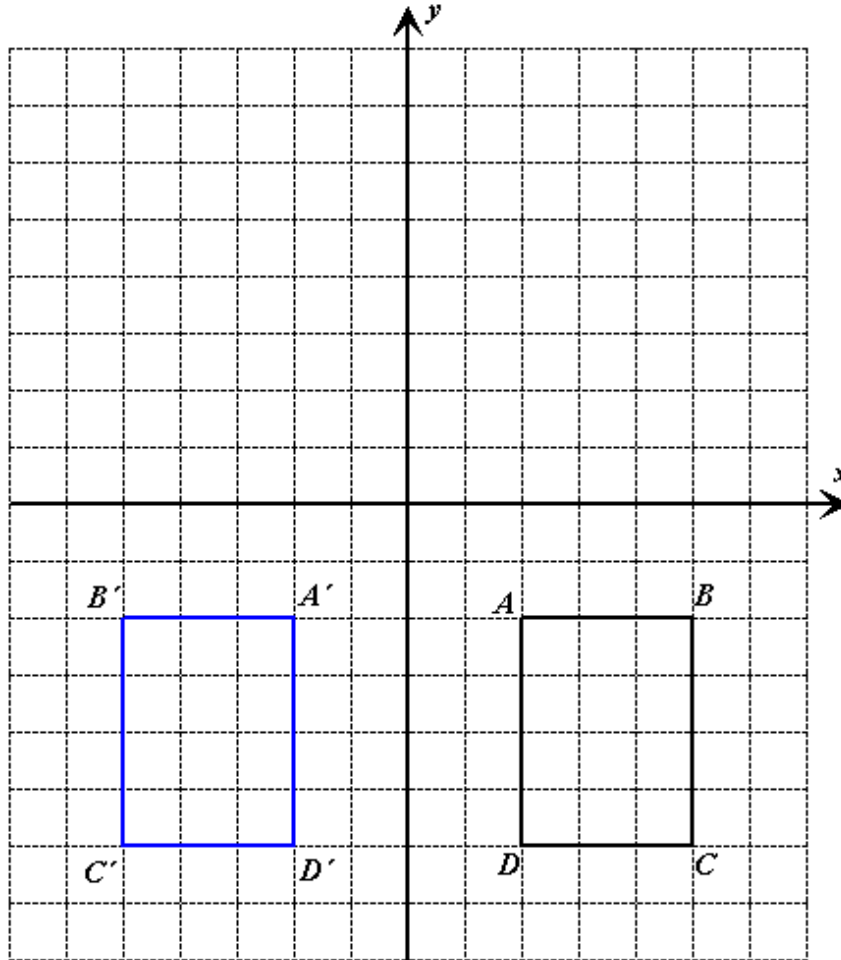


- (a) **Required** to draw and label $A'B'C'D'$.

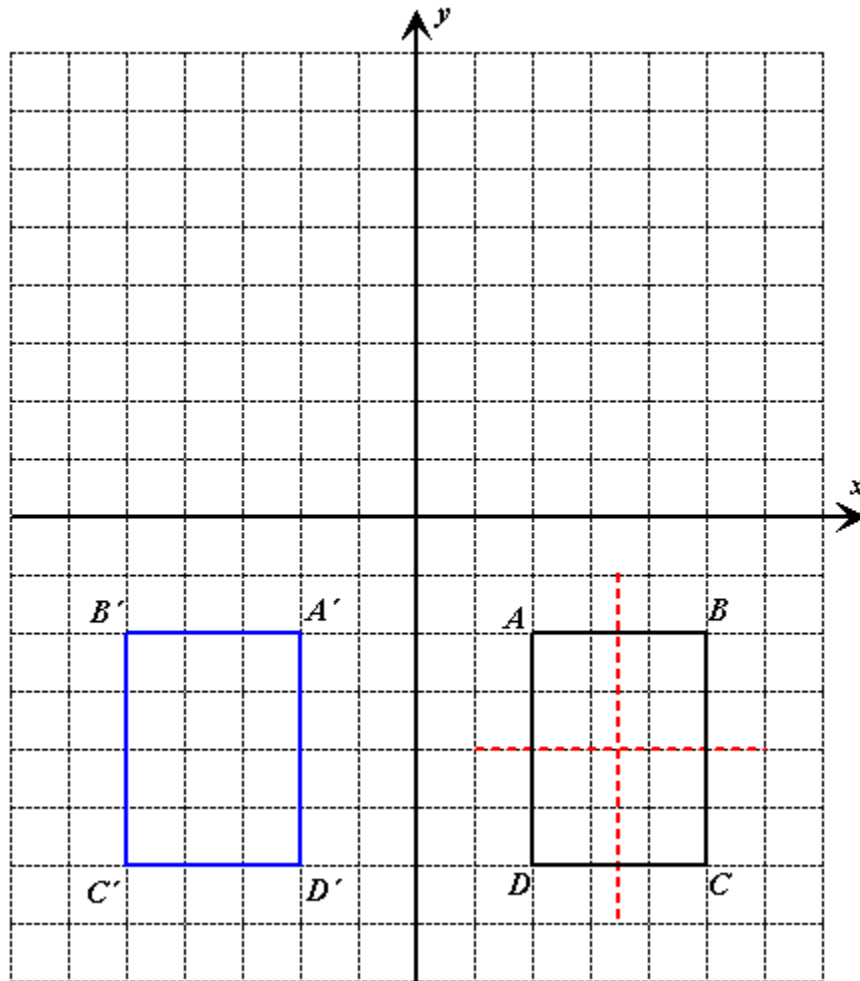
Solution:

$ABCD$ is a rectangle of width 3 blocks and length 4 blocks.

The image is always the same perpendicular distance away from but on the opposite side of the reflective plane, as the object.



- (b) **Required to draw:** The lines of symmetry for $ABCD$ on the diagram above.
Solution:



6. **Data:** A calendar showing the number of texts that Ria sent each day for the month of April.

April						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
¹ 5	² 1	³ 4	⁴ 3	⁵ 2	⁶ 5	⁷ 3
⁸ 5	⁹ 3	¹⁰ 2	¹¹ 4	¹² 1	¹³ 1	¹⁴ 2
¹⁵ 4	¹⁶ 3	¹⁷ 3	¹⁸ 5	¹⁹ 3	²⁰ 3	²¹ 1
²² 2	²³ 5	²⁴ 1	²⁵ 3	²⁶ 2	²⁷ 4	²⁸ 5
²⁹ 3	³⁰ 2					

- (a) **Required to find:** The number of texts sent on Thursday 19th April.

Solution:

From the table, we can see that 3 texts were sent on that day.

- (b) **Required to complete:** The frequency table for the given data.

Solution:

Number of texts	Tally	Frequency
1		5
2		6
3		9
4		4
5		6
		$\sum f = 30$

- (c) **Required to calculate:** The total number of texts Ria sent.

Calculation:

$$\text{Total number of texts sent} = \sum fx$$

$$\begin{aligned} 1 \text{ text on 5 days} &= 1 \times 5 \\ &= 5 \text{ texts} \end{aligned}$$

$$\begin{aligned} 2 \text{ texts on 6 days} &= 2 \times 6 \\ &= 12 \text{ texts} \end{aligned}$$

$$\begin{aligned} 3 \text{ texts on 9 days} &= 3 \times 9 \\ &= 27 \text{ texts} \end{aligned}$$

$$\begin{aligned} 4 \text{ texts on 4 days} &= 4 \times 4 \\ &= 16 \text{ texts} \end{aligned}$$

$$\begin{aligned} 5 \text{ texts on 6 days} &= 5 \times 6 \\ &= 30 \text{ texts} \end{aligned}$$

$$\begin{aligned} \text{Total number of texts sent} &= 5 + 12 + 27 + 16 + 30 \\ &= 90 \text{ texts} \end{aligned}$$

- (d) **Required to calculate:** The mean number of texts Ria sent per day.
Calculation:

$$\begin{aligned}\text{Mean number of texts sent per day} &= \frac{\sum fx}{\sum f} \\ &= \frac{\text{Total no. of texts sent}}{\text{No. of days}} \\ &= \frac{90}{30} \\ &= 3 \text{ texts}\end{aligned}$$

SECTION II

7. (a) **Data:** The 10% down payment on a vacation is \$120 US.
US \$1.00 = TT \$6.50
- (i) **Required to calculate:** The down payment in TT dollars.
Calculation:
Down payment = US \$120
= TT (\$120 × 6.50)
= TT \$780.00
- (ii) **Required to calculate:** The total cost of the vacation in TT dollars.
Calculation:
10% of the cost of the vacation costs = TT \$780
∴ 1% of the cost of the vacation will cost = TT $\frac{\$780}{10}$
= \$78
The total cost of the vacation (100%) will have a cost = \$78 × 100
= \$7 800
- (b) **Data:** Principal = \$7200, rate = 8% per annum and time = 7 years.
- (i) **Required to calculate:** The interest earned on the investment.
Calculation:
Simple interest = $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$
= $\frac{\$7200 \times 8 \times 7}{100}$
= \$4032

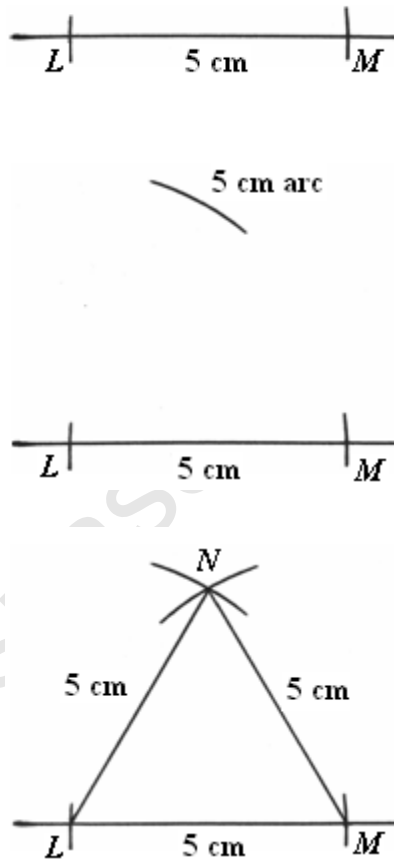
- (ii) **Required to calculate:** The total amount she will receive from her investment.

Calculation:

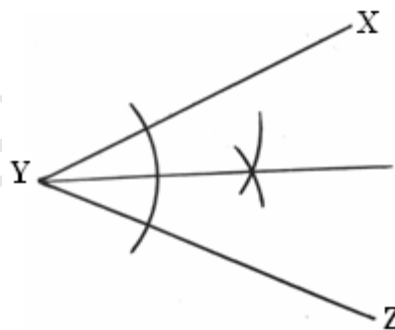
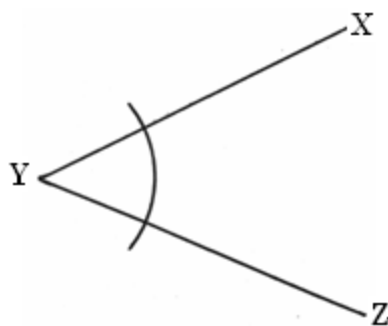
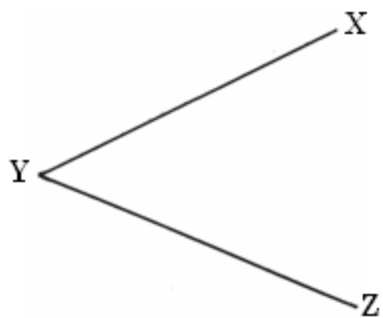
$$\begin{aligned}\text{Amount that Mrs. Gift will receive} &= \text{Amount deposited} + \text{Interest earned} \\ &= \$7200 + \$4032 \\ &= \$11232\end{aligned}$$

- (c) (i) **Required To Construct:** Triangle LMN with lengths $LM = MN = LN = 5$ cm.

Construction:

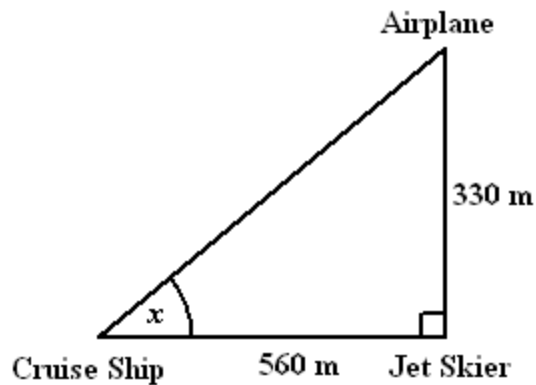


- (ii) **Required to bisect:** Angle XYZ .
Solution:



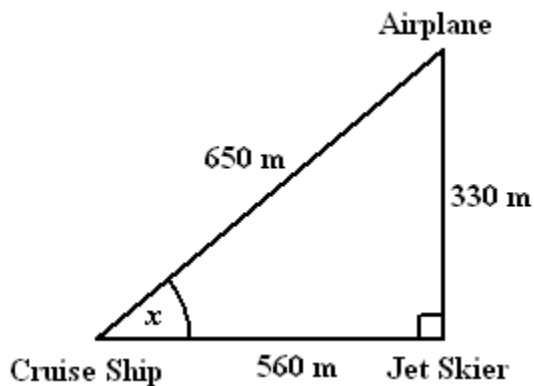
8. (a) **Data:** Diagram showing an airplane, a cruise ship and a jet skier.
(i) **Required to calculate:** The distance between the airplane and the cruise ship.

Calculation:



The distance between the airplane and the cruise ship
 $= \sqrt{(330)^2 + (560)^2}$ (Pythagoras' Theorem)
 $= 650 \text{ m}$

- (ii) **Required to calculate:** The size of the angle x .
Calculation:



$$\begin{aligned}\tan x &= \frac{330}{560} \\ x &= \tan^{-1}\left(\frac{330}{560}\right) \\ &= 30.51^\circ \\ &= 30.5^\circ \text{ (to the nearest } 0.1^\circ\text{)}\end{aligned}$$

OR

$$x = \sin^{-1} \left(\frac{330}{650} \right)$$

$$x = \cos^{-1} \left(\frac{560}{650} \right)$$

$$x = 30.5^\circ \text{ (to the nearest } 0.1^\circ \text{ or 1 d.p.)}$$

- (b) **Data:** Paul goes to Rita's house to study. He leaves home at 3:55 pm and arrives at Rita's house at 4:35 pm. Paul lives 800 m away from Rita. Paul and Rita's homework assignment is to draw a map of the neighborhood, using a scale of 1 cm to represent 200 m.

- (i) **Required to determine:** The number of centimetres used to represent the actual distance between Paul's house and Rita's house.

Solution:

Actual distance = 800 m

Scale is

200 m \equiv 1 cm

$$\therefore 1 \text{ m} \equiv \frac{1}{200} \text{ cm}$$

$$\begin{aligned} 800 \text{ m} &\equiv \frac{1}{200} \times 800 \text{ cm} \\ &= 4 \text{ cm} \end{aligned}$$

- (ii) **Required to determine:** The distance from Paul's house to Rita's house in kilometres.

Solution:

1000 m = 1 km

$$1 \text{ m} = \frac{1}{1000} \text{ km}$$

$$\begin{aligned} 800 \text{ m} &= \frac{1}{1000} \times 800 \text{ km} \\ &= 0.8 \text{ km} \end{aligned}$$

- (iii) **Required to determine:** The length of time, Paul took to arrive at Rita's house.

Solution:

Time of arrival	4 : 35 pm
Time of departure	<u>3 : 55 pm</u>
	<u> </u> : 40

Time taken = 40 minutes

- (iv) **Required to determine:** The time taken, in hours, for Paul to arrive at Rita's house.

Solution:

Time taken by Paul = 40 minutes

60 minutes = 1 hour

$$1 \text{ minute} = \frac{1}{60} \text{ hour}$$

$$40 \text{ minutes} = \frac{1}{60} \times 40 \text{ hour}$$

$$= \frac{2}{3} \text{ hour}$$

- (v) **Required to determine:** Paul's average speed while walking from his house to Rita's house.











Solution:

$$\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= \frac{0.8 \text{ km}}{\frac{2}{3} \text{ hour}}$$

$$= 1.2 \text{ kmh}^{-1}$$

9. (a) **Data:** Table showing the number of pens and pencils and the amount spent by Raj and Ana. Cost of 1 pen = \$x. Cost of 1 pencil = \$y.

Raj						Total Cost \$51.00
Ann						Total Cost \$39.00

- (i) **Required to write:** An equation, in x and y , to represent the total cost of the pens and pencils Raj bought.

Solution:

Raj spent \$51 to purchase 3 pens and 2 pencils.

Hence,

$$(3 \times x) + (2 \times y) = 51$$

$$3x + 2y = 51 \quad \dots(1)$$

- (ii) **Required to determine:** The cost of 1 pen and 1 pencil using a pair of simultaneous equations.

Solution:

Ann spent \$39 to purchase 2 pens and 3 pencils.

Hence,

$$(2 \times x) + (3 \times y) = 39$$

$$2x + 3y = 39 \quad \dots(2)$$

Equation (1) $\times 2$

$$6x + 4y = 102 \dots(3)$$

Equation (2) $\times -3$

$$-6x - 9y = -117 \quad \dots(4)$$

Equation (3) + Equation (4)

$$\begin{array}{r} 6x + 4y = 102 \\ + \quad -6x - 9y = -117 \\ \hline -5y = -15 \end{array}$$

Hence,

$$\begin{aligned} y &= \frac{-15}{-5} \\ &= 3 \end{aligned}$$

When $y = 3$, substitute into (1)

$$3x + 2(3) = 51$$

$$3x = 51 - 6$$

$$3x = 45$$

$$x = \frac{45}{3}$$

$$x = 15$$

Hence, the cost of 1 pen = \$15 and the cost of 1 pencil = \$3.

The method used was the method of elimination.

We could have solved the two equations by other methods.

Alternative method:

$$3x + 2y = 51 \quad \dots(1)$$

$$2x + 3y = 39 \quad \dots(2)$$

From equation (1)

$$3x = 51 - 2y$$

$$x = \frac{51 - 2y}{3}$$

Substitute in equation (2)

$$\frac{2(51 - 2y)}{3} + 3y = 39$$

$$\frac{2(51 - 2y)}{3} + \frac{3y}{1} = \frac{39}{1}$$

$\times 3$

$$2(51 - 2y) + 3(3y) = 3(39)$$

$$102 - 4y + 9y = 117$$

$$5y = 15$$

$$y = 3$$

Substitute $y = 3$

$$x = \frac{51 - 2(3)}{3}$$

$$= 15$$

The above method was the method of substitution

Alternative Method:

Consider both equations as straight lines and draw the lines on the same axes.

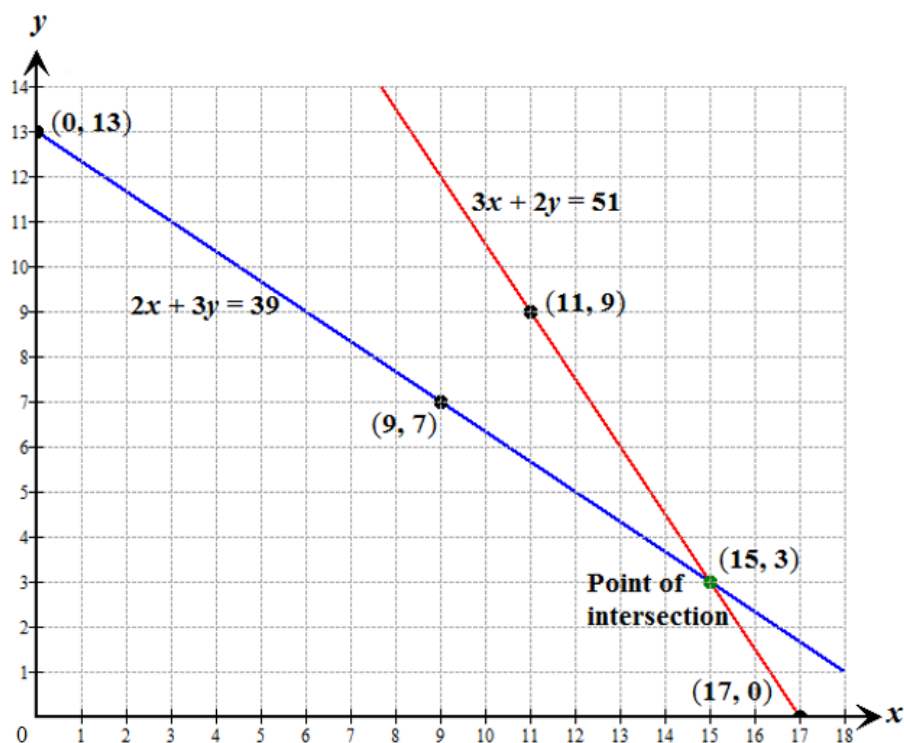
In each case, we choose any two values of x and find the corresponding values of y . The x value chosen and the corresponding y value, represents the (x, y) coordinates of a point on the line. We need only two points to draw any straight line. We join these two points and can extend the line to any desired length.

$$3x + 2y = 51$$

x	y
11	9
17	0

$$2x + 3y = 39$$

x	y
0	13
9	7



The above method is the graphical method

(b) **Data:** $y = 2x + 1$

(i) **Required to complete:** The table given, using the equation given.

Solution:

When $x = 0$

$$y = 2(0) + 1$$

$$= 1$$

When $x = 2$

$$y = 2(2) + 1$$

$$= 5$$

When $x = 3$

$$y = 2(3) + 1$$

$$= 7$$

When $x = 4$

$$y = 2(4) + 1$$

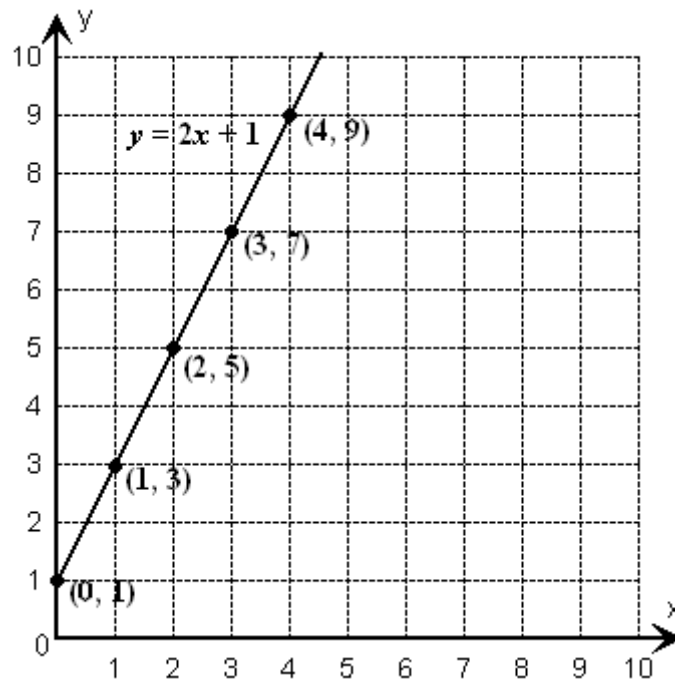
$$= 9$$

The completed table looks like:

x	0	1	2	3	4
y	1	3	5	7	9

- (ii) **Required to draw:** The graph of $y = 2x + 1$.

Solution:



- (iii) **Required to state:** The y – intercept for the graph of $y = 2x + 1$.

Solution:

The y – intercept of $y = 2x + 1$ is 1, that is, the line $y = 2x + 1$ cuts the y – axis at (0, 1).