# Way To Success – 10th Maths

## September 2020 Exam Answer Key

### Part – I

| Q.no | Option | Answer | Book Question Number |
|---|---|---|---|
| 1 | (a) | $(A \times C) \subset (B \times D)$ | Ex.1.6 – Q.No (3) |
| 2 | (c) | $2 - 4x$ | Creative |
| 3 | (a) | 0, 1, 8 | Ex.2.10 - Q.No (2) |
| 4 | (d) | A is larger than B by 1 | Ex.2.10 - Q.No (12) |
| 5 | (d) | 1 | Creative |
| 6 | (d) | Row matrix | Ex.3.20 - Q.No (17) |
| 7 | (b) | 70° | Ex.4.5 - Q.No (2) |
| 8 | (a) | 120° | Ex.4.5 - Q.No (15) |
| 9 | (b) | Parallel to $Y$-axis | Ex.5.5 - Q.No (3) |
| 10 | (c) | 2 | Creative |
| 11 | (c) | 6 cm | Creative |
| 12 | (a) | 2 : 1 | Ex.7.5 - Q.No (12) |
| 13 | (b) | 160900 | Ex.8.5 - Q.No (4) |
| 14 | (c) | 23/26 | Ex.8.5 - Q.No (14) |

### Part – II

**15. Example 1.2**

$A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$

$A = \{$set of all first coordinate of elements of $A \times B\}$

$\therefore A = \{3,5\}$

$B = \{$set of all second coordinates of elements of $A \times B\}$

$\therefore B = \{2,4\}$

**16. Exercise 1.4 - Question Number 5**

The function $f: \mathbb{N} \to \mathbb{N}$ defined by

$f(m) = m^2 + m + 3$

$m = 1, f(1) = (1)^2 + 1 + 3 = 1 + 1 + 3 = 5$

$m = 2, f(2) = (2)^2 + 2 + 3 = 4 + 2 + 3 = 9$

$m = 3, f(3) = (3)^2 + 3 + 3 = 9 + 3 + 3 = 15$

$m = 4, f(4) = (4)^2 + 4 + 3 = 16 + 4 + 3 = 23$

Since different elements of $N$ have different images in the codomain the function of ***f*** **is one-one function.**

**17. Exercise 2.2 – Question Number 2**

$n = 1, m = 1 \Rightarrow 2^1 \times 5^1 = 2 \times 5 = 10$

$n = 1, m = 2 \Rightarrow 2^1 \times 5^2 = 2 \times 25 = 50$

$n = 2, m = 3 \Rightarrow 2^2 \times 5^3 = 4 \times 125$

$= 500$

$\therefore 2^n$ is always even.

So that, the product of 5 is in always end digit is 0.

Hence, **No value** of $2^n \times 5^m$ end with the digit 5.

18. Creative Question

$a_3 = 3^2 = 9$ ($\because$ 3 is odd)

$a_4 = \frac{4^2}{2} = \frac{16}{2} = 8$ ($\because$ 4 is odd)

19. Creative Question

$1^2 + 2^2 + 3^2 + \cdots + 10^2 = \frac{10 \times 11 \times 21}{6} = 385$

$2^2 + 4^2 + 6^2 + \cdots + 20^2 = 2^2[1^2 + 2^2 + 3^2 + \cdots + 10^2] = 4 \times 385 = 1540$

20. **Creative Question**

$9x^2 + 3kx + 4 = 0 \Rightarrow a = 9, b = 3k, c = 4$

If roots are real and equal, $b^2 - 4ac = 0$

$$(3k)^2 - 4 \times 9 \times 4 = 0$$

$$9k^2 - 144 = 0$$

$$k^2 = \frac{144}{9}$$

$$k^2 = 16$$

$$k = +4 \; or \; -4$$

21. **Exercise 3.17 – Question Number 5**

$$-A = \begin{bmatrix} -\sqrt{7} & 3 \\ \sqrt{5} & -2 \\ -\sqrt{3} & 5 \end{bmatrix}$$

Transpose of $-A = \begin{bmatrix} -\sqrt{7} & \sqrt{5} & -\sqrt{3} \\ 3 & -2 & 5 \end{bmatrix}$

22. **Exercise 4.2 – Question Number 8(i)**

$\frac{AB}{AC} = \frac{5}{10}$

$\frac{AB}{AC} = \frac{1}{2}$…… (1)

$\frac{BD}{DC} = \frac{1.5}{3.5}$

$\frac{BD}{DC} = \frac{15}{35}$

$\frac{BD}{DC} = \frac{3}{7}$ …… (2)

(1) & (2) $\Rightarrow \frac{AB}{AC} \neq \frac{BD}{DC}$

$\therefore AD$ is **not an angle bisector** of $\angle A$

### 23. Example 5.9 (iii)

The slope $= \frac{-6-10}{14-14} = \frac{-16}{0}$

The slope is undefined

### 24. Exercise 6.1 – Question Number 3(i)

$$\sqrt{\frac{1+sin\theta}{1-sin\theta}} = \sqrt{\frac{1+sin\theta}{1-sin\theta} \times \frac{1+sin\theta}{1+sin\theta}}$$

$$= \sqrt{\frac{(1+sin\theta)^2}{1-\sin^2\theta}}$$

$$= \sqrt{\frac{(1+sin\theta)^2}{\cos^2\theta}}$$

$$= \frac{1+sin\theta}{cos\theta}$$

$$= \frac{1}{cos\theta} + \frac{sin\theta}{cos\theta}$$

$$= \boldsymbol{sec\theta + tan\theta}$$

### 25. Example 7.8

Let $r$ be the radius of the sphere.

Given that, surface area of sphere $= 154\ m^2$

$$4\pi r^2 = 154$$

$$4 \times \frac{22}{7} \times r^2 = 154$$

$$r^2 = 154 \times \frac{1}{4} \times \frac{7}{22}$$

$r^2 = \frac{49}{4}$ we get $r = \frac{7}{2}$

Therefore, diameter is 7m Type equation here.

### 26. Creative Question

Base area of hemisphere $\pi r^2 = 1386$ sq.m

$$= 3\pi r^2$$

$$= 3 \times 1386$$

$$= 4158 \text{ sq.m}$$

### 27. Exercise 8.1 – Question Number 1(i)

Arrange in Ascending order:

63,68,79,89,98,108,117,125

$Range = L - S$

$= 125 - 63 \quad = 62$

Coefficient of Range $= \frac{L-S}{L+S}$

$= \frac{125-63}{125+63}$

$= \frac{62}{188}$

$= 0.3297$

$= \mathbf{0.33}$

### 28. Creative Question

$h = 9$ cm, $R = 5$ cm, $r = 3$ cm

Volume of hollow cylinder $= \pi(R^2 - r^2)h$ cu.units

$= \frac{22}{7} \times (5^2 - 3^2) \times 9$

$= \frac{22}{7} \times (25 - 9) \times 9$

$= \frac{22}{7} \times (16) \times 9$

$= 452.57$ cu.cm

## Part – III

### 29. Exercise 1.1 – Question Number 7(i)

$A =$ The set of all natural numbers less than $8 = \{1,2,3,4,56,7\}$

$B =$ The set of all prime numbers less than $8 = \{2,3,5,7\}$

$C =$ The set of even prime number $= \{2\}$

$(A \cap B) \times C = (A \times C) \cap (B \times C)$

**LHS:** $A \cap B = \{1,2,3,4,5,6,7\} \cap \{2,3,5,7\}$

$= \{2,3,5,7\}$

$(A \cap B) \times C = \{2,3,5,7\} \times \{2\} = \{(\mathbf{2},\mathbf{2}), (\mathbf{3},\mathbf{2}), (\mathbf{5},\mathbf{2}), (\mathbf{7},\mathbf{2})\}$ ……(1)

**RHS:**

$A \times C = \{1,2,3,4,56,7\} \times \{2\}$

$= \{(1,2), (2,2), (3,2), (4,2), (5,2), (6,2), (7,2)\}$

$B \times C = \{2,3,5,7\} \times \{2\} = \{(2,2), (3,2), (5,2), (7,2)\}$

$(A \times C) \cap (B \times C) = \{(\mathbf{2},\mathbf{2}), (\mathbf{3},\mathbf{2}), (\mathbf{5},\mathbf{2}), (\mathbf{7},\mathbf{2})\}$ ……(2)

From (1) and (2), $(\boldsymbol{A} \cap \boldsymbol{B}) \times \boldsymbol{C} = (\boldsymbol{A} \times \boldsymbol{C}) \cap (\boldsymbol{B} \times \boldsymbol{C})$

### 30. Example 1.11

$A = \{1,2,3,4\}$ ; $B = \{2,5,8,11,14\}$ ; $f(x) = 3x - 1$

$f(1) = 3(1) - 1 = 3 - 1 = 2$ ; $f(2) = 3(2) - 1 = 6 - 1 = 5$

$f(3) = 3(3) - 1 = 9 - 1 = 8$ ; $f(4) = 4(3) - 1 = 12 - 1 = 11$

**(i) Arrow diagram**

Let us represent the function $f : A \to B$ by an arrow diagram (Fig.1.19).

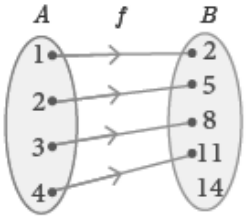


Fig. 1.19

**(ii) Table form**

The given function $f$ can be represented in a tabular form as given below

| $x$ | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $f(x)$ | 2 | 5 | 8 | 11 |

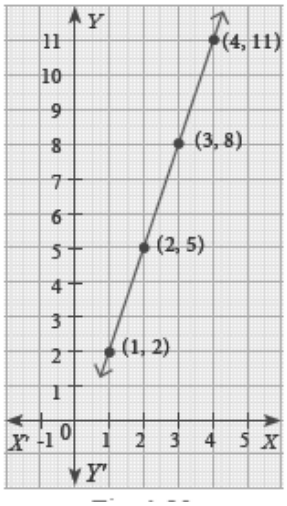
**(iii) Set of ordered pairs**

The function $f$ can be represented as a set of ordered pairs as

$f = \{(1,2),(2,5),(3,8),(4,11)\}$

**(iv) Graphical form**

In the adjacent $XY$-plane the points (1,2), (2,5), (3,8), (4,11) are plotted (Fig.1.20).




### 31. Creative Questions

Sum of all natural numbers between 100 and 1000 which are divisible by 11

$$= 110 + 121 + 132 + \cdots + 990$$

$$= 11[10 + 11 + 12 + \cdots + 90]$$

Sum of natural numbers $a$ to $b = \frac{(a+b)(a-b+1)}{2}$

$$= 11\left[\frac{(90+10)(90-10+1)}{2}\right]$$

$$= 11\left[\frac{100\times 81}{2}\right]$$

$$= 11 \times 50 \times 81$$

$$= 44{,}550$$

32. **Creative Questions**

$6x + 2y - 5z = 13$ ……(1)

$3x + 3y - 2z = 13$ ……(2)

$7x + 5y - 3z = 26$ ……(3)

$(2)\times 5 \Rightarrow 15x + 15y - \cancel{10z} = 65$

$(1)\times 2 \Rightarrow 12x + 4y - \cancel{10z} = 26$

$(-)\quad 3x + 11y = 39$ ……(4)

$(3)\times 2 \Rightarrow 14x + 10y - \cancel{6z} = 52$

$(2)\times 3 \Rightarrow 9x + 9y - \cancel{6z} = 39$

$(-)\quad 5x + y = 13$ ……(5)

$(4)\times \Rightarrow 3x + \cancel{11y} = 39$

$(5)\times 11 \Rightarrow 55x + \cancel{11y} = 143$

$(-)\quad -52x = -104$

$52x = 104$

$x = \frac{104}{52}$

$\boldsymbol{x = 2}$

Sub $x = 2$ in (4),

$3(2) + 11y = 39$

$6 + 11y = 39$

$11y = 39 - 6$

$11y = 33$

$y = \frac{33}{11}$

$\boldsymbol{y = 3}$

Sub $x = 2, y = 3$ in (1)

$6(2) + 2(3) - 5z = 13$

$12 + 6 - 5z = 13$

$18 - 5z = 13$

$-5z = -5$

$\boldsymbol{z = 1}$

### 33. Exercise 3.2 – Question Number 1 (i)

$$f(x) = x^4 + 3x^3 - x - 3$$
$$g(x) = x^3 + x^2 - 5x + 3$$

$$\begin{array}{r|l} & x + 2 \\ \hline x^3 + x^2 - 5x + 3 & \cancel{x^4} + 3x^3 - 0x^2 - x - 3 \\ & \cancel{x^4} + x^3 - 5x^2 + 3x \\ & (-)\ (-)\ (+)\ (-) \\ \hline & \cancel{2x^3} + 5x^2 - 4x - 3 \\ & \cancel{2x^3} + 2x^2 - 10x + 6 \\ & (-)\ (-)\ (+)\ (-) \\ \hline & 3x^2 + 6x - 9 \\ \hline & 3[x^2 + 2x - 3] \end{array}$$

$3[x^2 + 2x - 3] \neq 0$ here 3 is not a divisor of $g(x)$

$$\begin{array}{r|l} & x - 1 \\ \hline x^2 + 2x - 3 & \cancel{x^3} + x^2 - 5x + 3 \\ & \cancel{x^3} + 2x^2 - 3x \\ & (-)\ (-)\ (+) \\ \hline & \cancel{-x^2} - \cancel{2x} + \cancel{3} \\ & \cancel{-x^2} - \cancel{2x} + \cancel{3} \\ & (+)\ (+)\ (-) \\ \hline & 0 \end{array}$$

### 34. Creative Question

$$\begin{array}{r|l} & \frac{x}{y} - 5 + \frac{y}{x} \\ \hline \frac{x}{y} & \cancel{\frac{x^2}{y^2}} - \frac{10x}{y} + 27 - \frac{10y}{x} + \frac{y^2}{x^2} \\ & \cancel{\frac{x^2}{y^2}} \\ & (-) \\ \hline \frac{2x}{y} - 5 & -\cancel{\frac{10x}{y}} + 27 \\ & -\cancel{\frac{10x}{y}} + 25 \\ & (+)\ \ (-) \\ \hline \frac{2x}{y} - 10 + \frac{y}{x} & 2 - \cancel{\frac{10y}{x}} + \frac{y^2}{x^2} \\ & 2 - \cancel{\frac{10y}{x}} + \frac{y^2}{x^2} \\ & (-)\ (+)\ (-) \\ \hline & 0 \end{array}$$

$$\therefore \sqrt{\frac{x^2}{y^2} - \frac{10y}{x} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}} = \left|\frac{x}{y} - 5 + \frac{y}{x}\right|$$

### 35. Example 3.73

LHS $= (AB)^T$

$$AB = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}_{2\times3} \times \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}_{3\times2}$$

$$= \begin{pmatrix} 2-2+0 & -1+8+2 \\ 4+1+0 & -2-4+2 \end{pmatrix} = \begin{pmatrix} 0 & 9 \\ 5 & -4 \end{pmatrix}$$

$$(AB)^T = \begin{pmatrix} 0 & 9 \\ 5 & -4 \end{pmatrix}^T = \begin{pmatrix} 0 & 5 \\ 9 & -4 \end{pmatrix} \quad \ldots(1)$$

RHS $= (B^TA^T)$

$$B^T = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 4 & 2 \end{pmatrix},\ A^T = \begin{pmatrix} 1 & 2 \\ 2 & -1 \\ 1 & 1 \end{pmatrix}$$

$$B^TA^T = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 4 & 2 \end{pmatrix}_{2\times3} \times \begin{pmatrix} 1 & 2 \\ 2 & -1 \\ 1 & 1 \end{pmatrix}_{3\times2}$$

$$= \begin{pmatrix} 2-2+0 & 4+1+0 \\ -1+8+2 & -2-4+2 \end{pmatrix}$$

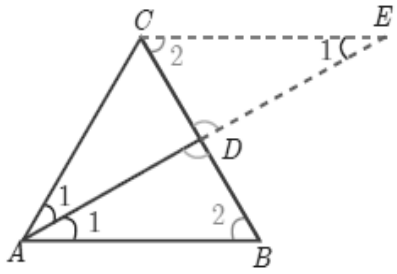
$$B^TA^T = \begin{pmatrix} 0 & 5 \\ 9 & -4 \end{pmatrix} \quad \ldots(2)$$

From (1) and (2), $(AB)^T = B^TA^T$.

Hence proved.

### 36. Theorem

**Angle Bisector Theorem**




**Statement:** The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

**Proof:**

Given : In $\Delta ABC$, $AD$ is the internal bisector

To prove: $\frac{AB}{AC} = \frac{BD}{CD}$

Construction : Draw a line through $C$ parallel to $AB$. Extend $AD$ to meet line through $C$ at $E$

| No. | Statement | Reason |
|---|---|---|
| 1. | $\angle AEC = \angle BAE = \angle 1$ | Two parallel lines cut by a transversal make alternate angles equal. |
| 2. | $\Delta ACE$ is isosceles<br>$AC = CE$ ..... (1) | In $\Delta ACE$, $\angle CAE = \Delta CEA$ |
| 3. | $\Delta ABD \backsim \Delta ECD$<br>$\frac{AB}{CE} = \frac{BD}{CD}$ | By $AA$ similarity |
| 4. | $\frac{AB}{AC} = \frac{BD}{CD}$ | From (1) $AC = CE$<br>Hence proved. |

### 37. Exercise 5.1 – Question Number 6

Area of quadrilateral = 28 square units

$$\frac{1}{2}\begin{bmatrix} -4 & -3 & 3 & 2 & -4 \\ -2 & k & -2 & 3 & -2 \end{bmatrix} = 28$$

$$[(-4k + 6 + 9 - 4) - (6 + 3k - 4 - 12)] = 56$$

$$(-4k + 11) - (3k - 10) = 56$$

$$-4k + 11 - 3k + 10 = 56$$

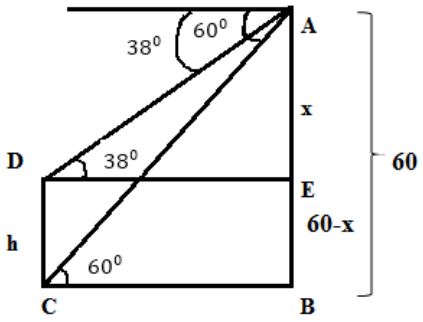
$$-7k = 56 - 21$$

$$-7k = 35$$

$$k = \frac{35}{-7}$$

$$\boldsymbol{k = -5}$$

### 38. Exercise 6.3 – Question Number 3




$AB$ =Tower $= 60m$

$CD$ =lamp post $= h$

$AE = x$

$CD = BE = 60 - x = h$

In right angle $\Delta\ AEC$

$$tan\ 38^{\circ} = \frac{AE}{DE} = 0.7813$$

$$DE = \frac{x}{0.7813} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In right angle $\Delta\ ABC$

$$\theta = 60^{\circ}$$

$$tan\ 60^{\circ} = \frac{AB}{BC} = \sqrt{3}$$

$$\frac{60}{BC} = \sqrt{3}$$

$$BC = \frac{60}{\sqrt{3}}$$

$$BC = \frac{60}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{60\sqrt{3}}{3}$$

$$BC = 20\sqrt{3}$$

$$BC = DE$$

$$\therefore DE = 20\sqrt{3} \ldots\ldots\ldots\ldots\ldots (2)$$

From (1) & (2)

$$DE \Rightarrow \frac{x}{0.7813} = 20\sqrt{3}$$

$$x = 20\sqrt{3} \times 0.7813$$

$$x = 20 \times 1.732 \times 0.7813$$

$$x = 27.064m$$

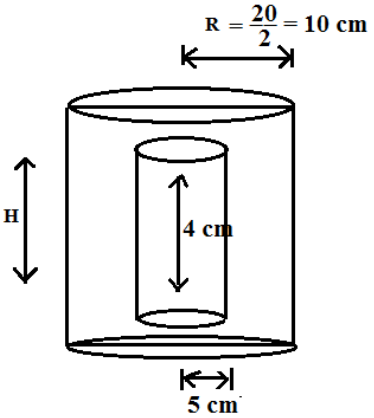
Height of the lamp post

$$h = 60 - x$$

$$= 60 - 27.064$$

$$\boldsymbol{h = 32.93m}$$

### 39. Exercise 7.2 – Question Number 2




Volume of water raised in cylindrical glass

$=$ Volume of cylindrical metal immersed

$$\pi R^2 H = \pi r^2 h$$

$$\pi \times 10 \times 10 \times h = \pi \times 5 \times 5 \times 4$$

$$h = \frac{5 \times 5 \times 4}{10 \times 10}$$

$$= 1$$

The raise of the water in the glass $\mathbf{= 1\ cm}$

### 40. Creative Question

| $x$ | $d = x_i - A$ $= x_i - 70$ | $d = \frac{x - A}{C}$ | $d^2$ |
|---|---|---|---|
| 40 | $-30$ | $-6$ | 36 |
| 50 | $-20$ | $-4$ | 16 |
| 60 | $-10$ | $-2$ | 4 |
| 70 | 0 | 0 | 0 |
| 80 | 10 | 2 | 4 |
| 90 | 20 | 4 | 16 |
| 95 | 25 | 5 | 25 |
| | | $\Sigma d = -1$ | $\Sigma d^2 = 101$ |

$$\sigma = \sqrt{\frac{\Sigma d^2}{n} - \left(\frac{\Sigma d}{n}\right)^2} \times C$$

$$= \sqrt{\frac{101}{7} - \left(\frac{-1}{7}\right)^2} \times 5$$

$$= \sqrt{\frac{101}{7} - \frac{1}{49}} \times 5$$

$$= \sqrt{\frac{706}{49}} \times 5$$

$$= \sqrt{14.41} \times 5$$

$$= 7.76$$

$\boldsymbol{\sigma \cong 19}$

### 41. Exercise 8.3 – Question Number 7

Two unbiased dice are rolled once.

$$S = \{(1,1),(1,2),(1,3),(1,4),(1,5),(1,6)$$
$$(2,1),(2,2),(2,3),(2,4),(2,5),(2,6)$$
$$(3,1),(3,2),(3,3),(3,4),(3,5),(3,6)$$
$$(4,1),(4,2),(4,3),(4,4),(4,5),(4,6)$$
$$(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)$$
$$(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\}$$

$$n(S) = 36$$

(i) Let the $A$ be event of getting a doublet.

$$A = \{(1,1),(2,2),(3,3),(4,4),(5,5),(6,6)\}$$

$$n(A) = 6,$$

$$\therefore P(A) = \frac{n(A)}{n(S)} = \frac{6}{36} = \mathbf{\frac{1}{6}}$$

(ii) Let $B$ be the event of getting the product as a prime number.

$$B = \{(1,2),(1,3),(1,5),(2,1),(3,1),(5,1)\}$$

$$n(B) = 6$$

$$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{6}{36} = \mathbf{\frac{1}{6}}$$

(iii) Let $C$ be the event of getting the sum as a prime number.

$$C = \{(1,1),(1,2),(1,4),(1,6),(2,1),$$
$$(2,3),(2,5),(3,2),(3,4),(4,1),$$
$$(4,3),(5,2),(5,6),(6,1),(6,5)\}$$

$$n(C) = 15$$

$$\therefore P(C) = \frac{n(C)}{n(S)} = \frac{15}{36} = \mathbf{\frac{5}{12}}$$

(iv) Let $D$ be the event of getting the sum as 1.

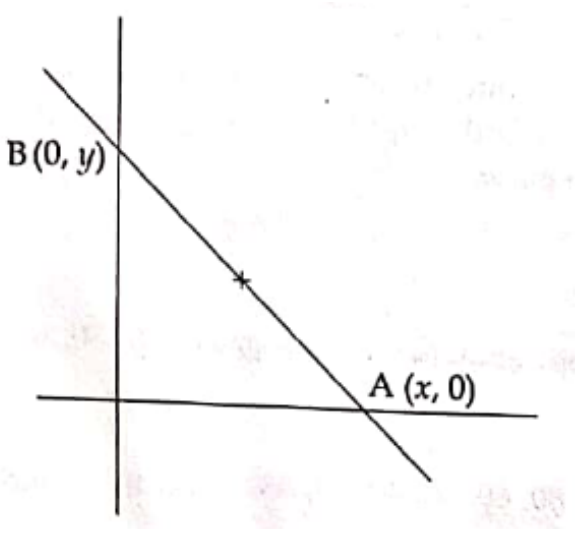
$$D = \{\ \ \}$$

$$n(D) = 0$$

$$\therefore P(D) = \frac{n(D)}{n(S)} = \frac{0}{36} = 0$$

$$\therefore P(D) = \mathbf{0}$$

42. **Creative Question**




Required equation of $AB$ is $\frac{x}{a}+\frac{y}{b}=1$ .....(1)

If equation (1) meet $X-$axis, $y=0 \Rightarrow x=a$

$\therefore A(a,0)$

If equation (1) meet $Y-$axis, $x=0 \Rightarrow y=b$

$\therefore B(0,b)$

Mid point of $AB$ is (2,3)

$\left(\frac{a+0}{2},\frac{0+b}{2}\right)=(2,3)$

$\left(\frac{a}{2},\frac{b}{2}\right)=(2,3)$

$\frac{a}{2}=2 \Rightarrow a=4$

$\frac{b}{2}=3 \Rightarrow b=6$

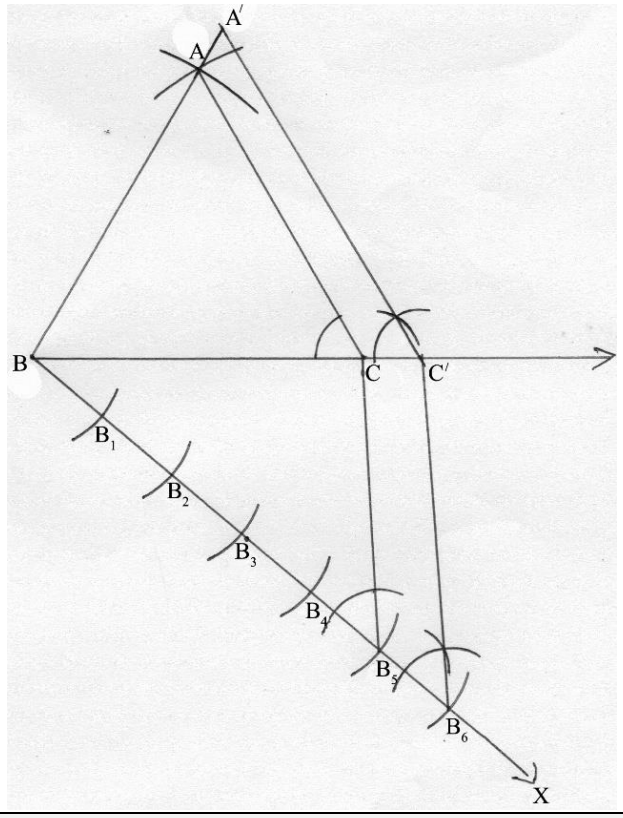
$\therefore$ Equation of $AB$ is $\frac{x}{4}+\frac{y}{6}=1$

$\frac{6x+4y}{24}=1$

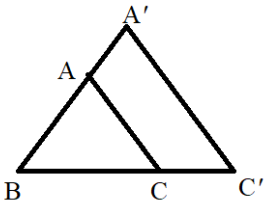
$6x+4y=24$

$\div by\ 2, \qquad 3x+2y=12$

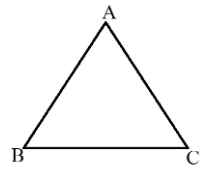
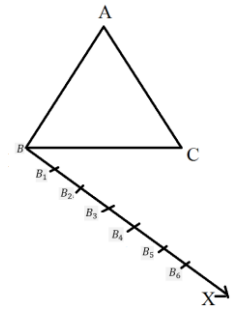
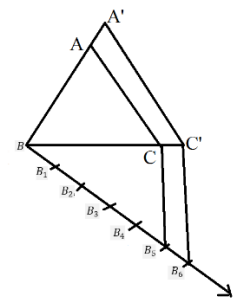
43. (a) Exercise 4.1 – Question Number 12



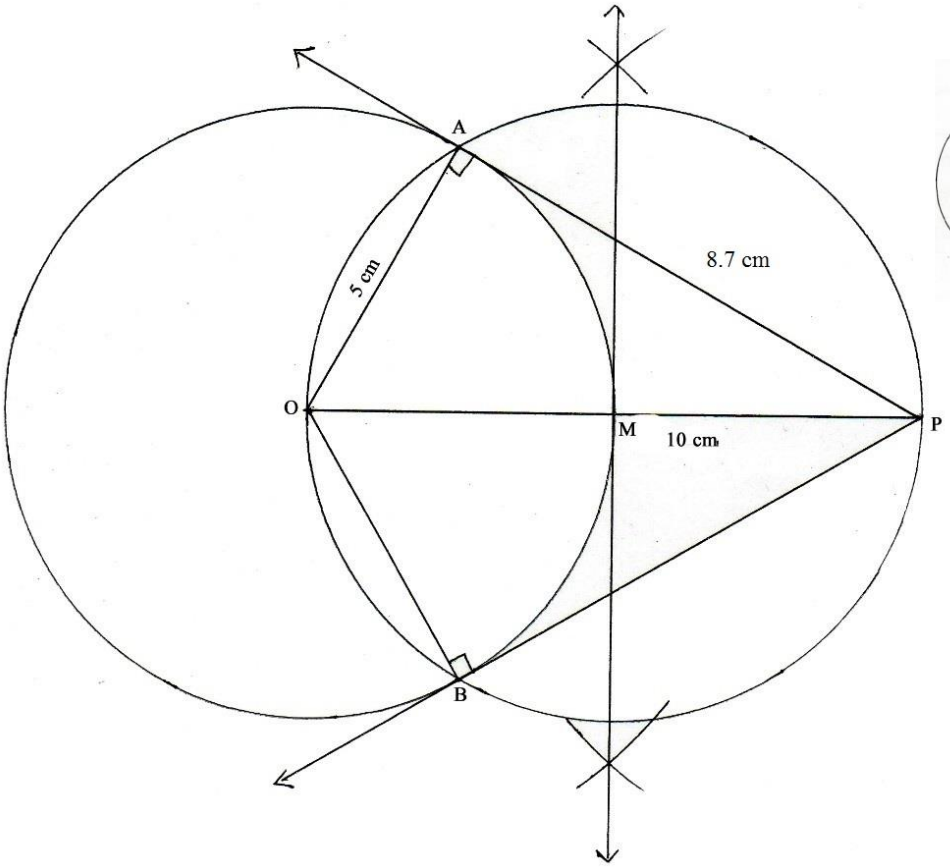

Rough Diagram



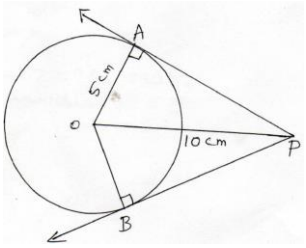

**Note:** If $\frac{6}{5} > 1$, then the similar triangle will be outside

| Steps of construction: | |
|---|---|
|  | 1. Construct a $\Delta ABC$ with any measurement. |
|  | 2. Draw a ray $BX$ making an acute angle with $BC$ on the side opposite to vertex $A$.<br>3. Locate 6 points (the greater of 6 and 5 in $\frac{6}{5}$) $B_1$, $B_2$, $B_3$, $B_4$, $B_5$ and $B_6$ on $BX$ so that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5 = B_5B_6$ |
|  | 4. Joint $B_4$ (the 5th point, 5 being smaller of 6 and 5 in $\frac{6}{5}$) to $A$ and draw a line through $B_6$ parallel to $B_5C$ intersecting the extended line segment $BC$ at $C'$.<br>5. Draw a line through $C'$ parallel to $CA$ intersecting the extended line segment $BA$ at $A'$. Then $A'BC'$ is the required triangle each of whose sides is six-fifths of the corresponding sides of $\Delta ABC$. |

(b) **Exercise 4.4 – Question Number 13**




Rough diagram

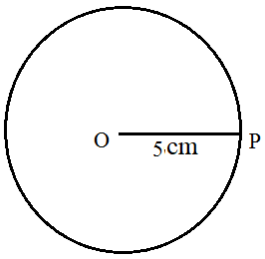



The length of the tangent is 8.7cm

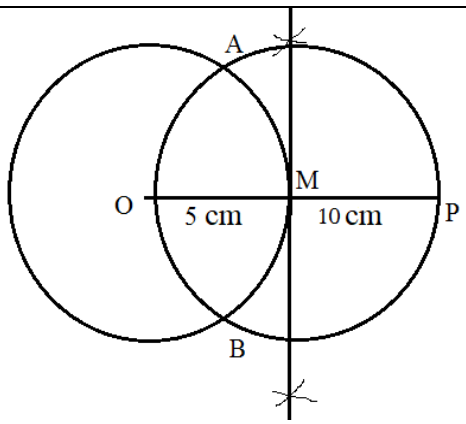
**Verification:**

$PA = \sqrt{OP^2 - OA^2}$ $= \sqrt{10^2 - 5^2}$ $= \sqrt{100 - 25}$ $= \sqrt{75}$ $\simeq \mathbf{8.7\ cm}$

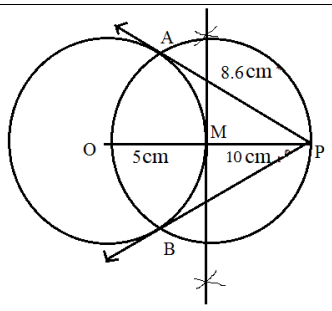
**Construction:**




1. Draw a circle of radius 5 $cm$ with $O$ as Centre.




2. Mark a point $P$, 10 $cm$ away from the Centre $O$.
3. Join $OP$
4. Draw a perpendicular bisector for $OP$ and Mark the point $OP$ meets at $M$.
5. With $M$ as centre, $MO$ or $MP$ as radius draw a circle which cuts the previous circle at $A$ and $B$.

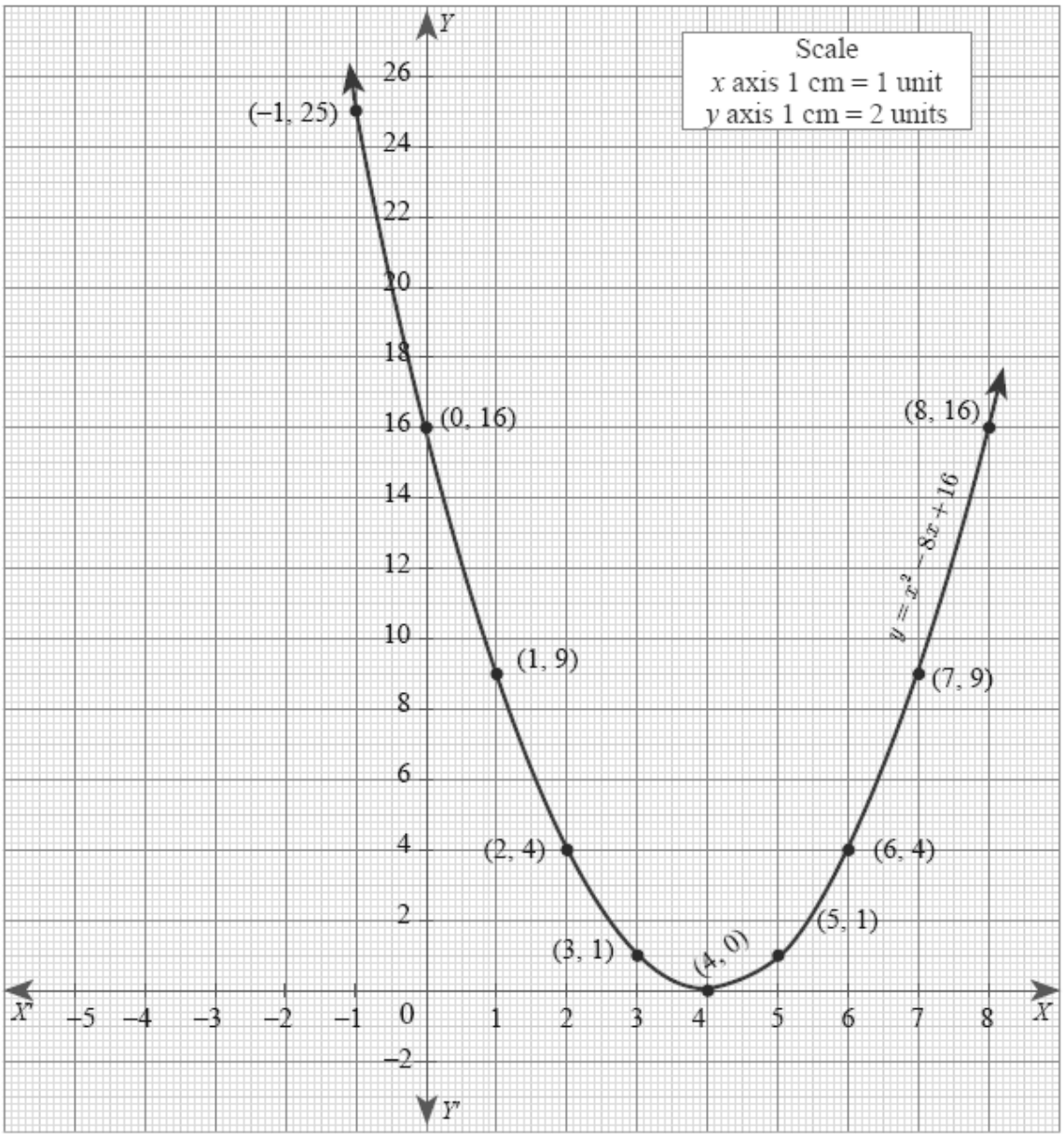



6. Join $PA$ and $PB$ which are the required tangents.

44. (a) Example 3.51 (ii)

$x^2 - 8x + 16 = 0$

| $x$ | −1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 25 | 16 | 9 | 4 | 1 | 0 | 1 | 4 | 9 | 16 |




Solution: {4,0}

Real and equal roots

### (b) Exercise 3.16 – Question Number 7

$y = 2x^2 - 3x - 5$

| $x$ | $-2$ | $-1$ | $0$ | $1$ | $2$ | $3$ | $4$ | $5$ |
|---|---|---|---|---|---|---|---|---|
| $x^2$ | 4 | 1 | 0 | 1 | 4 | 9 | 16 | 25 |
| $2x^2$ | 8 | 2 | 0 | 2 | 8 | 18 | 32 | 50 |
| $-3x$ | 6 | 3 | 0 | $-3$ | $-6$ | $-9$ | $-12$ | $-15$ |
| $-5$ | $-5$ | $-5$ | $-5$ | $-5$ | $-5$ | $-5$ | $-5$ | $-5$ |
| $y = 2x^2 - 3x - 5$ | 9 | 0 | $-5$ | $-6$ | $-3$ | 4 | 15 | 30 |

Points: $(-2,9), (-1,0), (0,-5), (1,-6), (2,-3), (3,4), (4,15), (5,30)$

$y = 2x^2 - 3x - 5$

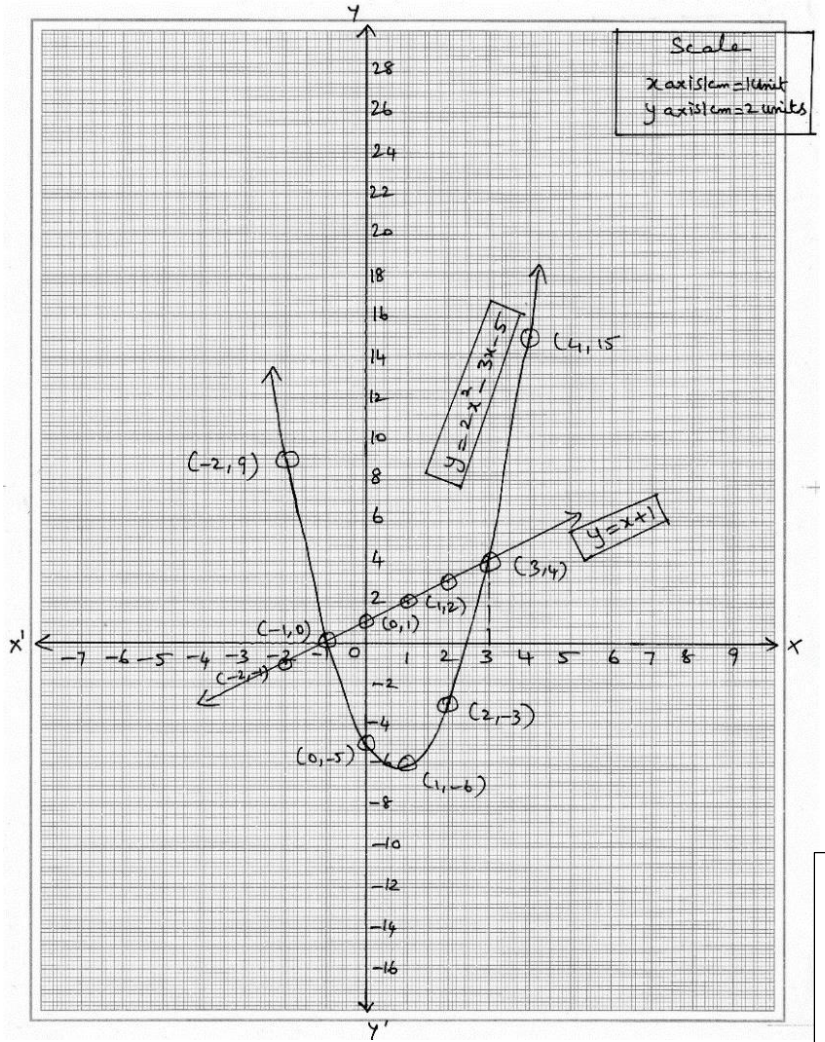
$0 = 2x^2 - 4x - 6$

(−) (+) (+)

$y = x + 1$

| $x$ | $-2$ | $-1$ | $0$ | $1$ | $2$ | $3$ |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| $y = x + 1$ | $-1$ | 0 | 1 | 2 | 3 | 4 |

Points: $(-2,-1), (-1,0), (0,1), (1,2), (2,3), (3,4)$




Solution: $\{-1, 3\}$