

15/07/2020

classmate

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Exercise 3.11

Q.1 Let the length and the breadth of a rectangle be x and y .
Area of rectangle = xy

ATQ,

$$\begin{aligned}(x+2)(y-2) &= xy - 28 \\ xy - 2x + 2y - 4 &= xy - 28 \\ -2x + 2y &= -28 + 4 \\ 2x - 2y &= 24 \\ x - y &= 12 \quad \text{--- (1)}\end{aligned}$$

$$\begin{aligned}(x-1)(y+2) &= xy + 33 \\ xy + 2x - y - 2 &= xy + 33 \\ 2x - y &= 33 + 2 \\ 2x - y &= 35 \quad \text{--- (2)}\end{aligned}$$

Subtract (2) from (1),

$$\begin{array}{r} x - y = 12 \\ 2x - y = 35 \\ \hline (-) \quad (+) \quad (-) \\ \hline -x = -23 \\ \hline x = 23 \end{array}$$

Putting the value of x in (1),

$$\begin{aligned}x - y &= 12 \\ 23 - y &= 12 \\ 23 - 12 &= y \\ \hline y &= 11\end{aligned}$$

$$\begin{aligned}\text{Area of rectangle} &= xy = 23 \times 11 \\ &= 253 \text{ units}^2\end{aligned}$$

Let the length and the breadth of a rectangle be x and y .
Area of rectangle = xy .

ATQ,

$$(x+3)(y-4) = xy - 67$$

$$xy - 4x + 3y - 12 = xy - 67$$

$$-4x + 3y = -67 + 12$$

$$4x - 3y = 55 \quad \text{--- (1)}$$

$$(x-1)(y+4) = xy + 89$$

$$xy + 4x - y - 4 = xy + 89$$

$$4x - y = 89 + 4$$

$$4x - y = 93 \quad \text{--- (2)}$$

Subtract (1) from (2),

$$4x - y = 93$$

$$4x - 3y = 55$$

$$\begin{array}{r} (-) \quad (+) \quad (-) \\ \hline \end{array}$$

$$2y = 38$$

$$\boxed{y = 19}$$

Putting value of y in (1)

$$4x - 3y = 55$$

$$4x - 3(19) = 55$$

$$4x = 55 + 57$$

$$x = \frac{112}{4}$$

$$x = 28$$

$$\boxed{x = 28}$$

$\therefore$ Length of rectangle = $\boxed{28\text{m}}$

Breadth of rectangle = $\boxed{19\text{m}}$

Ratio of incomes = $8:7$

Ratio of expenditures = $19:16$

Let the income of X and Y be $8x$ & $7x$.

Let the expenditures of X and Y be $19y$ & $16y$

ATQ,

$$8x - 19y = 1250 \text{ --- ①}$$

$$7x - 16y = 1250 \text{ --- ②}$$

Multiply ① by 7 and ② by 8.

$$56x - 133y = 8750 \text{ --- ③}$$

$$56x - 128y = 10000 \text{ --- ④}$$

Subtract ④ from ③,

$$\begin{array}{r} 56x - 133y = 8750 \\ 56x - 128y = 10000 \\ \hline (-) \quad (+) \quad (-) \\ \hline 5y = -1250 \\ y = \frac{-1250}{5} \\ \hline y = 250 \end{array}$$

$$\boxed{y = 250}$$

Putting value of y in ①

$$\begin{aligned} 8x - 19y &= 1250 \\ 8x - 19(250) &= 1250 \\ 8x &= 1250 + 4750 \\ x &= \frac{6000}{8} \end{aligned}$$

$$\boxed{x = 750}$$

$$\therefore \text{Income of X} = 8x = 750 \times 8 = \boxed{\text{₹ } 6000}$$

$$\text{Income of Y} = 7x = 750 \times 7 = \boxed{\text{₹ } 5250}$$

Q.5 Let the money with A and B be x and y .

ATQ,

$$2(x - 30) = y + 30$$

$$2x - 60 = y + 30$$

$$2x - y = 30 + 60$$

$$2x - y = 90 \text{ ————— ①}$$

$$x + 10 = 3(y - 10)$$

$$x + 10 = 3y - 30$$

$$x - 3y = -30 - 10$$

$$x - 3y = -40 \text{ ————— ②}$$

Multiply ① by 3

$$6x - 3y = 270 \text{ ————— ③}$$

Subtract ② from ③,

$$6x - 3y = 270$$

$$x - 3y = -40$$

$$\begin{array}{r} (-) \quad (+) \quad (+) \\ \hline \end{array}$$

$$5x = 310$$

$$x = \frac{310}{5} = 62$$

$$\boxed{x = 62}$$

Putting value of x in ①

$$2x - y = 90$$

$$2(62) - y = 90$$

$$124 - 90 = y$$

$$\boxed{y = 34}$$

$$\therefore \text{Money with A} = \boxed{\text{₹ } 62}$$

$$\text{Money with B} = \boxed{\text{₹ } 34}$$

Let the work done by one man and boy be x and y.

$$\text{1 day work of man} = \frac{1}{x}$$

$$\text{1 day work of boy} = \frac{1}{y}$$

ATQ,

$$\frac{2}{x} + \frac{7}{y} = \frac{1}{4} \quad \text{--- (1)}$$

$$\frac{4}{x} + \frac{4}{y} = \frac{1}{3} \quad \text{--- (2)}$$

Let $\frac{1}{x} = A$ and $\frac{1}{y} = B$

$$2A + 7B = \frac{1}{4}$$

$$8A + 28B = 1 \quad \text{--- (3)}$$

$$4A + 4B = \frac{1}{3}$$

$$12A + 12B = 1 \quad \text{--- (4)}$$

Multiply (3) by 3 and (4) by 2.

$$24A + 84B = 3 \quad \text{--- (5)}$$

$$24A + 24B = 2 \quad \text{--- (6)}$$

Subtract (6) from (5),

$24A + 84B = 3$	
$24A + 24B = 2$	
(-) (-) (-)	
$60B = 1$	
$B = \frac{1}{60}$	

$\frac{1}{y} = \frac{1}{60}$
$y = 60$

Putting value of B in Q,

$$12A + 12B = 1$$

$$12A + 12\left(\frac{1}{60}\right) = 1$$

$$12A = 1 - \frac{1}{5}$$

$$A = \frac{5-1}{5 \times 12}$$

$$A = \frac{1}{60}$$

$$60 \times 15$$

$$\frac{1}{x} = \frac{1}{15}$$

$$\boxed{x = 15}$$

$\therefore$ Time taken by 1 man to finish the work = 15 days

Time taken by 1 boy to ~~finish~~ finish the work = 60 days

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Q. 8

$$\angle A = x^\circ$$

$$\angle B = (3x - 2)^\circ$$

$$\angle C = y^\circ$$

$$\angle C - \angle B = 9^\circ$$

Sum of angles in a $\Delta = 180^\circ$,

$$\therefore \angle A + \angle B + \angle C = 180^\circ$$

$$x + (3x - 2) + y = 180^\circ$$

$$x + 3x - 2 + y = 180^\circ$$

$$4x + y = 182^\circ \quad \text{--- (1)}$$

Also, $\angle C - \angle B = 9^\circ$

$$y - (3x - 2) = 9$$

$$y - 3x + 2 = 9$$

$$-3x + y = 7$$

$$3x - y = -7 \quad \text{--- (2)}$$

Add

~~Subtract~~ (2) from (1),

~~$$4x - y = 182$$~~

~~$$3x - y = -7$$~~

~~$$\begin{array}{r} (-) \quad (+) \quad (+) \end{array}$$~~

$$4x + y = 182$$

$$(+)\quad 3x - y = -7$$

$$7x = 175$$

$$x = 175$$

$$\boxed{x = 25}$$

Putting value of x in ①,

$$4x + y = 182$$

$$4(25) + y = 182$$

$$y = 182 - 100$$

$$\boxed{y = 82}$$

$$\therefore \angle A = x = \boxed{25^\circ}$$

$$\angle B = 3x - 2 = (3 \times 25) - 2 = \boxed{73^\circ}$$

$$\angle C = y = \boxed{82^\circ}$$

$$\angle A = (2x + 4)^\circ$$

$$\angle B = (y + 3)^\circ$$

$$\angle C = (2y + 10)^\circ$$

$$\angle D = (4x - 5)^\circ$$

As ABCD is a cyclic quadrilateral, therefore, sum of opp. angles is equal to 180° .

$$\therefore \angle A + \angle C = 180^\circ$$

$$2x + 4 + 2y + 10 = 180^\circ$$

$$2x + 2y = 180 - 14$$

$$x + y = 83 \quad \text{--- ①}$$

$$\angle B + \angle D = 180^\circ$$

$$y + 3 + 4x - 5 = 180^\circ$$

$$4x + y = 180 + 2$$

$$4x + y = 182 \quad \text{--- ②}$$

Subtract ① from ②,

$$4x + y = 182$$

$$x + y = 83$$

$$(-) \quad (-) \quad (-)$$

$$3x = 99$$

$$x = \frac{99}{3}$$

$$\boxed{x = 33}$$

Putting value of x in ①,

$$x + y = 83$$

$$y = 83 - 33$$

$$y = 50^\circ$$

$$\therefore LA = 2x + 4 = (2 \times 33) + 4 = 70^\circ$$

$$LB = y + 3 = 50 + 3 = 53^\circ$$

$$LC = 2y + 10 = (2 \times 50) + 10 = 110^\circ$$

$$LD = 4x - 5 = (4 \times 33) - 5 = 127^\circ$$

Q. 11

In $\triangle ABC$,

$$LA = x$$

$$LB = 3x$$

$$LC = y$$

ATQ,

$$LA + LB + LC = 180^\circ$$

$$x + 3x + y = 180^\circ$$

$$4x + y = 180$$

$$y = 180 - 4x \quad \text{--- ①}$$

$$3y - 5x = 30 \quad \text{--- ②}$$

Substituting Value of y in ②

$$3y - 5x = 30$$

$$3(180 - 4x) - 5x = 30$$

$$540 - 12x - 5x = 30$$

$$-17x = -540 + 30$$

$$x = \frac{-540 + 30}{-17}$$

$$x = 30$$

$$x = 30^\circ$$

Putting value of x in ①

$$y = 180 - 4x$$

$$y = 180 - 4(30)$$

$$y = 180 - 120$$

$$y = 60^\circ$$

$$\angle A = x = \boxed{30^\circ}$$

$$\angle B = 3x = 3 \times 30^\circ = \boxed{90^\circ}$$

$$\angle C = y = \boxed{60^\circ}$$

$\therefore$ ABC is a ~~rt~~ Δ right angled at B.

Q.12 Let the fixed charges be x and the charge per km be y .

ATQ,

$$x + 12y = 89 \quad \text{--- ①}$$

$$x + 20y = 145 \quad \text{--- ②}$$

Subtract ① from ②,

$$\begin{array}{r} x + 20y = 145 \\ - (x + 12y = 89) \\ \hline 8y = 56 \\ \boxed{y = 7} \end{array}$$

Putting value of y in ①

$$\begin{aligned} x + 12y &= 89 \\ x + 12(7) &= 89 \\ x &= 89 - 84 \\ \boxed{x = 5} \end{aligned}$$

$$\begin{aligned} \therefore \text{Charges for 30 km} &= x + 30y \\ &= 5 + 30(7) \\ &= 5 + 210 \\ &= \boxed{\text{₹ } 215} \end{aligned}$$

Q.14 Let the length and the breadth of a garden be x & y .

ATQ,

$$\begin{aligned} x &= y + 4 \\ x - y &= 4 \quad \text{--- ①} \end{aligned}$$

$$\frac{x(x+y)}{x} = 36$$

$$x+y = 36 \quad \text{--- ②}$$

Add ① & ②,

$$\begin{array}{r} x-y = 4 \\ (+) \quad x+y = 36 \\ \hline 2x = 40 \\ \boxed{x = 20} \end{array}$$

Putting value of y in ①

$$\begin{array}{r} x-y = 4 \\ 20-y = 4 \\ \boxed{y = 16} \end{array}$$

$$\begin{array}{l} \therefore \text{Length of garden} = \boxed{20 \text{ m}} \\ \text{Breadth of garden} = \boxed{16 \text{ m}} \end{array}$$

Q.18 Let the students in room A and B be x and y .

ATQ,

$$\begin{array}{r} x-10 = y+10 \\ x-y = 10+10 \\ x-y = 20 \quad \text{--- ①} \end{array}$$

$$\begin{array}{r} x+20 = 2(y-20) \\ x+20 = 2y-40 \\ x-2y = -40-20 \\ x-2y = -60 \quad \text{--- ②} \end{array}$$

Subtract ① from ②

$$\begin{array}{r} x-2y = -60 \\ (-) \quad (+) \quad (-) \\ \hline x-y = 20 \\ (-) \quad (+) \quad (-) \\ \hline +y = +80 \end{array}$$

$$\boxed{y = 80}$$

Putting value of y in ①,

$$x - y = 20$$

$$x = 20 + 80$$

$$\boxed{x = 100}$$

$$\therefore \text{Students in room A} = \boxed{100}$$

$$\text{Students in room B} = \boxed{80}$$

Let the fare of full ticket be x and the reservation charge be y .

ATQ,

$$x + y = 216 \quad \text{--- ①}$$

$$1.5x + 2y = ~~327~~ 327$$

$$\frac{3x + 2y}{2} = ~~327~~ 327$$

$$3x + 4y = 654 \quad \text{--- ②}$$

Multiply ① by 4,

$$4x + 4y = 864 \quad \text{--- ③}$$

Subtract ② from ③,

$$\begin{array}{r} 4x + 4y = 864 \\ 3x + 4y = 654 \\ \hline (-) \quad (-) \quad (-) \\ \boxed{x = 210} \end{array}$$

Putting value of x in ①

$$x + y = 216$$

$$y = 216 - 210$$

$$\boxed{y = 6}$$

$$\therefore \text{Fare of full ticket} = \boxed{\text{₹ } 210}$$

$$\text{Reservation charge} = \boxed{\text{₹ } 6}$$

Let the stake

Q.21 Let the no. of rows be x and the students in each row be y .

$$\text{Total students} = xy$$

ATQ,

$$(x-1)(y+3) = xy$$

$$\cancel{xy} - y + 3x - 3 = \cancel{xy}$$

$$3x - y = 3 \quad \text{--- (1)}$$

$$(x+2)(y-3) = xy$$

$$\cancel{xy} + 2y - 3x - 6 = \cancel{xy}$$

$$-3x + 2y = 6$$

$$3x - 2y = -6 \quad \text{--- (2)}$$

Subtract (1) from (2),

$$\begin{array}{r} 3x - 2y = -6 \\ 3x - y = 3 \\ \hline (-) \quad (+) \quad (+) \end{array}$$

$$3x - 2y = -6$$

$$3x - y = 3$$

$$(-) \quad (+) \quad (-)$$

$$y = 9$$

$$\boxed{y = 9}$$

Putting value of y in (1) =

$$3x - y = 3$$

$$3x - 9 = 3$$

$$3x = 12$$

$$\boxed{x = 4}$$

$$\therefore \text{Total students} = 4 \times 9 = \boxed{36}$$

Q.24 Let the no. of correct and wrong answers be x and y

ATQ,

$$x + y = 120 \text{ ——— (1)}$$

$$x - y = 90$$

$$2x - y = 180 \text{ ——— (2)}$$

Add (1) & (2),

$$\begin{array}{r} x + y = 120 \\ (+) 2x - y = 180 \\ \hline 3x = 300 \\ \boxed{x = 100} \end{array}$$

Putting value of x in (1)

$$\begin{array}{r} x + y = 120 \\ y = 120 - 100 \\ \boxed{y = 20} \end{array}$$

$\therefore$ Jivanti answered 100 questions correctly.

Q.25 Let the fixed charge for first two days be x and additional charge for ^{extra} day be y .

ATQ,

$$x + 4y = 22 \text{ ——— (1)}$$

$$x + 2y = 16 \text{ ——— (2)}$$

Subtract (2) from (1)

$$\begin{array}{r} x + 4y = 22 \\ (-) x + 2y = 16 \\ \hline (-) (-) (-) \\ 2y = 6 \\ \boxed{y = 3} \end{array}$$

Putting value of y in ①,

$$x + 2y = 16$$

$$x + 2(3) = 16$$

$$x = 16 - 6$$

$$\boxed{x = 10}$$

$\therefore$ Fixed charge for first 2 days = ₹ 10

Additional charge for extra day = ₹ 3

Let the stake-money for 1st = x

— do —

2nd = y

$$\therefore x - \frac{3}{4}y = 12 \quad \Rightarrow \quad 4x - 3y = 48$$

$$\therefore y - \frac{2}{3}x = 12 \quad \Rightarrow \quad 3y - 2x = 36$$

$$4x - 3y = 48 \quad \text{--- (1)}$$

$$-2x + 3y = 36 \quad \text{--- (2)}$$

$$2x = 84$$

$$\boxed{x = 42}$$

$$\text{Putting in (1)} \Rightarrow 4 \times 42 - 3y = 48$$

$$\Rightarrow 3y = 168 - 48 = 120$$

$$\Rightarrow \boxed{y = 40}$$