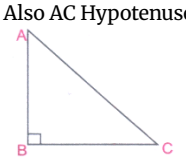
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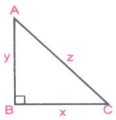
Answers Key:

5 Marks

1. Let the speed of the passenger train be x km/hr. Then,
Speed of the express train = (x + 11)km/hr
Time taken by the passenger train to cover 132 km between Mysore to Bangalore $\frac{132}{x}$hr
Time taken by the express train to cover 132 km between Mysore to Bangalore = = $\frac{132}{x+11}$hr
Therefore,
$\frac{132}{x}-\frac{132}{x+11}=1$
$\frac{132(x+11)-132x}{x(x+11)}=1$
$\frac{132x+1452-132x}{x^2+11}=1$
$\frac{1452}{x^2+11}=1$
1452 = x^2 + 11
x^2 + 11 - 1452 = 0
x2 - 33x + 44x - 1452 = 0
x(x - 33) + 44(x - 33) = 0
(x - 33)(x + 44) = 0
So, either
x - 33 = 0
x = 33
Or
x + 44 = 0
x = -44
But, the speed of the train can never be negative.
Thus, when x = 33 then speed of express train
= x + 11
= 33 + 11
= 44
e speed of the passenger train is x = 33 km/hr
and the speed of the express train is x = 44 km/hr respectively.
2. Let consecutive positive integers be n, + I and n + 2
According to the question,
n^2+(n+1)(n+2) =46 $\Rightarrow$ $2n^2$+3n-44=0
$\Rightarrow 2n^2+11n-8n-44=0 \Rightarrow n(2n-11)-4(2n+11)=0$
$\Rightarrow (n-4)(2n+11)=0 \Rightarrow n-4=0$ or 2n+11=0
$\Rightarrow n=4$ or $n=\frac{11}{2}$
Integers are 4,5,6
3. Let ABC is the right-angled triangle.
Let BC=x units and AB=y units.
Also AC Hypotenuse=29 units



Now Perimeter=70 units
$\Rightarrow$ x+y+29=70
$\Rightarrow$ x+y=41
$\Rightarrow$ y=41-x ....(i)
Also, $AC^2=AB^2+BC^2$
$\Rightarrow (29)^2=(y)^2+x^2$
$\Rightarrow$ 841=$(41-x)^2+x^2$ [Using (i)]
$\Rightarrow$ 841=$1681+x^2-82x+x^2$
$\Rightarrow$ $2x^2-82x+840=0$
$\Rightarrow$ $x^2-41x+420=0$
$\Rightarrow$ (x-20)(x-21)=0
$\Rightarrow$ x=20 or x=21
Wnen x=20, y=41-x=21 and when x=21, y=41-21=20
$\therefore$ Length of other sides are 20 units and 21 units.



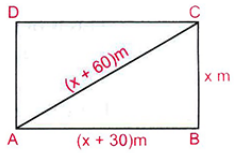
4. Let shortest side be x unit! and other side be units Hypotenuse = z units
ATQ x+y+z = 5x
$\Rightarrow$ y+z=4x
$\Rightarrow$ z=4x-y
Also, area of the rectangle = 15x
$\Rightarrow \frac{1}{2}x.y = 15x \Rightarrow y = 30$ ...(i)
Using Pythagoras Theorem, we get
$z^2=x^2+y^2$
$\Rightarrow (4x-y)^2 = x^2+y^2$
$\Rightarrow$ $(4x - 30)^2 = x^2+(30)^2$ [using (i)]
$\Rightarrow 16x^2 - 240x + 900 = x^2 + 900$
$\Rightarrow 15x^2 - 240x = 0 \Rightarrow 15x(x - 16) = 0$
$\Rightarrow$ x=0 (rejecting) or x=16
$\therefore x = 16$
$\therefore$ length of the shortest side = 16 units
length of other side = 30 units
length of hypotenuse z = 4 x 16 - 30
= 34 units
5. 41 years, 11 years

2 Marks

6. Let the marks secured by She fali in Mathematics be x,
then, marks in English be 30-x
ATQ (x+2)(30-x-3)=210 $\Rightarrow$ (x+2)(27-x)=210
$\Rightarrow 27x-x^2+54-2x=210 \Rightarrow -x^2+25x+54-210=0$
$\Rightarrow x^2-25x+156=0 \Rightarrow x^2-13x-12x+156=0$
$\Rightarrow$ x(x-13)-12(x-13)=0 $\Rightarrow$ (x-12)(x-13)=0
$\Rightarrow$ x-12=0 or x-13=0
$\Rightarrow$ x=12 or x=13
If marks in Maths x=12 then marks in English=30-12=18
If marks in Maths x=13 then marks in English=30-13=17

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7. Let the shorter side of rectangle be x m then, longer side be (x+30) m and diagonal be (x+60) m
In right-angled $\triangle$ABC, $(x+60)^2=(x+30)^2+(x)^2$ [Pythagoras Theorem]
$\Rightarrow x^2+120x+3600=x^2+60x+900+x^2$
$\Rightarrow x^2-60x-2700=0 \Rightarrow x^2-90x+30x-2700=0$
$\Rightarrow$ x(x-90)+30(x-90)=0 $\Rightarrow$ (x+30)(x-90)=0
$\Rightarrow$ x+30=0 or x-90=0 $\Rightarrow$ x=-30(rejected) or x=90
Hence, shorter side=90m and longer side=90+30=120 m



8. Let the larger and smaller number be x and y respectively.
According to the question,
$x^2 - y^2 = 180$ and $y^2 = 8x$
$\Rightarrow x^2 - 8x = 180$
$\Rightarrow x^2 - 8x - 180 = 0$
$\Rightarrow x^2 - 18x + 10x - 180 = 0$
$\Rightarrow x(x - 18) + 10(x - 18) = 0$
$\Rightarrow (x - 18)(x + 10) = 0$
$\Rightarrow x = 18, -10$
However, the larger number cannot be negative as 8 times of the larger number will be negative and hence, the square of the smaller number will be negative which is not possible.
Therefore, the larger number will be 18 only.
x = 18
$\therefore y^2 = 8x = 8 \times 18 = 144$
$\Rightarrow y = \pm\sqrt{144} = \pm 12$
$\therefore$ Smaller number = ±12
Therefore, the numbers are 18 and 12 or 18 and -12.
9. Let the time taken by the smaller pipe to fill the tank be x hr.
Time taken by the larger pipe = (x - 10) hr

Part of tank filled by smaller pipe in 1 hour = 1/x

Part of tank filled by larger pipe in 1 hour = $\frac{1}{x-10}$

It is given that the tank can be filled in $9\frac{3}{8}$ hours by both the pipes together. Therefore,

$\frac{1}{x} + \frac{1}{x-10} = \frac{8}{75}$

$\frac{x-10+x}{x(x-10)} = \frac{8}{75}$

$\Rightarrow \frac{2x-10}{x(x-10)} = \frac{8}{75}$

$\Rightarrow 75(2x - 10) = 8x^2 - 80x$

$\Rightarrow 150x - 750 = 8x^2 - 80x$

$\Rightarrow 8x^2 - 230x + 750 = 0$

$\Rightarrow 8x^2 - 200x - 30x + 750 = 0$

$\Rightarrow 8x(x - 25) - 30(x - 25) = 0$

$\Rightarrow (x - 25)(8x - 30) = 0$

$\Rightarrow x = 25, 30/8$

Time taken by the smaller pipe cannot be 30/8 = 3.75 hours. As in this case, the time taken by the larger pipe will be negative, which is logically not possible.

Therefore, time taken individually by the smaller pipe and the larger pipe will be 25 and 25 - 10 =15 hours respectively.

10. Let denominator be x then numerator be x-1

$\therefore$ Fraction= $\frac{x-1}{x}$

ATQ $\frac{x-1+3}{x+3} = \frac{x-1}{x} + \frac{3}{28}$

$\Rightarrow \frac{x+2}{x+3} - \frac{x-1}{x} = \frac{3}{28}$

$\Rightarrow \frac{x+2}{x+3} - \frac{x-1}{x} = \frac{3}{28}$

$\Rightarrow 3 \times 28=3(x2+3x)$

$\Rightarrow x^2+3x-28=0$

$\Rightarrow (x+7)(x-4)=0$ x=-7 or x=4

Rejecting x=-7 $\therefore$ x=4

$\therefore$ Fraction is $\frac{4-1}{4} = \frac{3}{4}$

Multiple Choice Question

11. (b) 12
12. (d) real and unequal
13. (c) 7
14. (b) 5
15. (c) no real roots

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