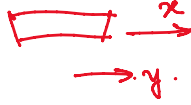**Q :** A boat rows downstream covers a distance of 20 km in 2 hrs while it covers the same distance upstream in 5 hrs. Then speed of the boat in still water is :
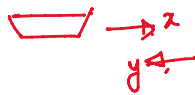
(A) 9 km/ hr

(B) 10 km/ hr

(C) 7 km/ hr ✓

(D) 8 km/ hr

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}.$$

Downstream — Net speed of the boat $= x+y$.

Upstream — Net speed $= x-y$.

$$\frac{20}{x+y} = 2.$$

$$x+y = 10$$
$$x-y = 4$$
$$\overline{2x = 14} \quad x = 7.$$

$$\frac{20}{x-y} = 5$$

---

**Q :** The greatest number that can be subtracted from 10000 so that the remainder may be divisible by 32, 36, 48 and 54 is-

(A) 9136 ✓

(B) 9216

(C) 9316

(D) 9236

$$32 = 2^5$$
$$36 = 2^2 \times 3^2$$
$$48 = 2^4 \times 3.$$
$$54 = 2 \times 3^3$$

$$\text{LCM} = 2^5 \times 3^3$$
$$= 32 \times 27$$
$$= 864$$

$$\begin{array}{r} 10000 \\ -\ 864 \\ \hline 9136 \end{array}$$

**Q :** Three Alarm make a beep after every 48 sec, 72 sec and 108 sec respectively. They beeped together at 10 a.m. The time when they will next make a beep together at the earliest is

(A) 10:07:36 hrs

(B) 10:07:24 hrs

(C) 10:07:12 hrs ✓

(D) 10:07:48 hrs

$48 = 2^4 \times 3$

$72 = 2^3 \times 3^2$

$108 = 2^2 \times 3^3$

$LCM = 2^4 \times 3^3 = 16 \times 27$
$= 432 \sec$

$\dfrac{432}{60} = 7 \text{ mn. } 12 \sec$

$\begin{array}{r} 27 \\ \underline{16} \\ 162 \\ 27 \\ \underline{\phantom{0}} \\ 432 \end{array}$

Bell (2)　2　4　6　8　10　⑫ — — · · — ·

Bell (3)　3　6　9　⑫ · · · · —

Bell (4) →　4　8　⑫　16　· · — — —

**Q :** The average score obtained by Sandeep in 12 Tests is 25. Rumella has an average of 23 marks so far, but has competed in only 8 Tests. What average will Rumela have to earn in the remaining 4 Tests to be equal to Raghuveer's average? Sandeeps

(A) 28

(B) 29 ✓

(C) 26

(D) 27

Total marks of Sandeep in 12 tests = total marks of Rumela in 12 tests

$25 \times 12 = 23 \times 8 + x \times 4$

$300 - 184 = 4x$

$\dfrac{116}{4} = x$

$x = 29$

**Q :** Rahul and Rohan enter into a partnership with their capitals in the ratio 7:9. At the end of $8^{th}$ month, Rahul withdraws his capital. If they receive the profits in the ratio 8:9, find how long Rohan's capital was used.

(A) 4 month

(B) 6 month

(C) 7 month ✓

(D) 8 month

Ratio of profits = Ratio of the (investments × time)

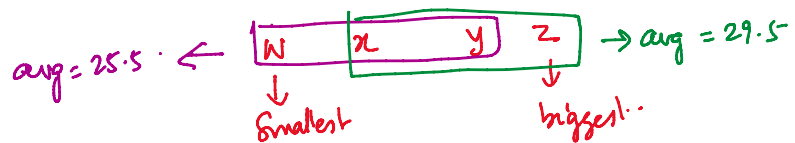| | Rahul | Rohan |
|---|---|---|
| Investment | $7x$ | $9x$ |
| time | $8$ | $t$ |
| | $56x$ : | $9xt$ |

$$\frac{56x}{9xt} = \frac{8}{9}$$

$$t = \frac{56}{9} \times \frac{9}{8} = 7$$

Smallest to biggest.

**Q :** Four numbers, when arranged in ascending order, are w, x, y and z. The average of the smallest three numbers is 25.5 while the average of the largest three was 29.5. What is the range of the data?

(A) 10

(B) 15

(C) 12 ✓

(D) 14

Range = Max value − Min value = Z−W

avg = 25.5 ← | W | x | y | Z | → avg = 29.5
     ↓ Smallest              ↓ biggest.

$w + x + y = 3 \times 25.5$

$x + y + z = 3 \times 29.5$

$Z - W = 3 \times 29.5 - 3 \times 25.5$

$= 3 \times 4 = 12$

**Q :** If $x = 2 - 2^{\frac{1}{3}} + 2^{\frac{2}{3}}$, then the value of $x^3 - 6x^2 + 18x + 18$.

(A) 22

(B) 33

(C) 40 ✓

(D) 45

$(x-2)^3 + 6x + 26$

$x - 2 = 2^{2/3} - 2^{1/3}$.

$(x-2)^3 = \left(2^{2/3}\right)^3 - 3.\left(2^{2/3}\right)^2 . 2^{1/3} + 3. 2^{2/3}\left(2^{1/3}\right)^2 - \left(2^{1/3}\right)^3$.

$= 2^2 - 3 . 2^{4/3} . 2^{1/3} + 3. 2^{2/3} . 2^{2/3} - 2$

$6x = 12 - 6 . 2^{1/3} + 6 . 2^{2/3}$

$(a-b)^3 = a^3 - 3a^2 b + 3ab^2 - b^3$

$(a-2)^3 = x^3 - 3x^2 . 2 + 3.x.2^2 - 8$

$+ 6x + 26$

$= 2 - 3 . 2^{5/3} + 3. 2^{4/3}$.

$= 2 - 3 . 2.2^{2/3} + 3.2.2^{1/3}$

$$= 2^{\cdot} - 3\cdot 2^{\cdot}\cdot 2^{\cdot} + 5\cdot 2^{\cdot}\cdot 2^{\cdot} \ldots$$

$$6x = 12 - 6\cdot 2^{1/3} + 6\cdot 2^{2/3}$$

$$= 2 - 3\cdot 2\cdot 2^{2/3} + 3\cdot 2\cdot 2^{1/3}$$

$$= 2 - 6\cdot 2^{2/3} + 6\cdot 2^{1/3}$$

$$14 + 26 = 40$$

---

**Q :** If $x^2 + 3x + 1 = 0$, then the value of $x^3 + \dfrac{1}{x^3}$

(A) -18

(B) 18

(C) 36

(D) -36

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$$= (a+b)^3 - 3ab(a+b)$$

$x^2 + 3x + 1 = 0$

divide both sides by $x$.

$x + 3 + \dfrac{1}{x} = 0$

$x + \dfrac{1}{x} = -3.$

$x^3 + \dfrac{1}{x^3} = \left(x + \dfrac{1}{x}\right)^3 - 3\cdot x\cdot \dfrac{1}{x}\left(x + \dfrac{1}{x}\right)$

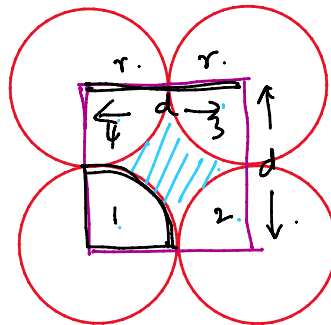$$= \left(x + \dfrac{1}{x}\right)^3 - 3\left(x + \dfrac{1}{x}\right)$$

$$= (-3)^3 - 3(-3)$$

$$= -27 + 9 = -18.$$

---

**Q :** Four coins whose diameter is 12.6 cm are placed in such a way that one coin touches the other coin, find the area between them.

(A) 34.02 sq.cm

(B) 28.30 sq.cm

(C) 50.05 sq.cm

(D) 25.05 sq.cm

$40$
$\times 0.9$
$\boxed{\cdot 36}$

$12.6^2 = 6.3^2 \times 2^2$

$6.3$
$6.3$
$189$
$378$
$39.69$

$0.86.$



Reqd Area $= (12.6)^2 - \pi \times 6.3^2.$

$$= 6.3^2(4 - \pi) \quad = 6.3^2 \times (4 - 3.14)$$

$$=$$

Area of the square
$$= (\text{diameter})^2 = (12.6)^2.$$

Area of a quadrant
$$= \dfrac{\pi r^2}{4}$$

Area of 4 quadrants
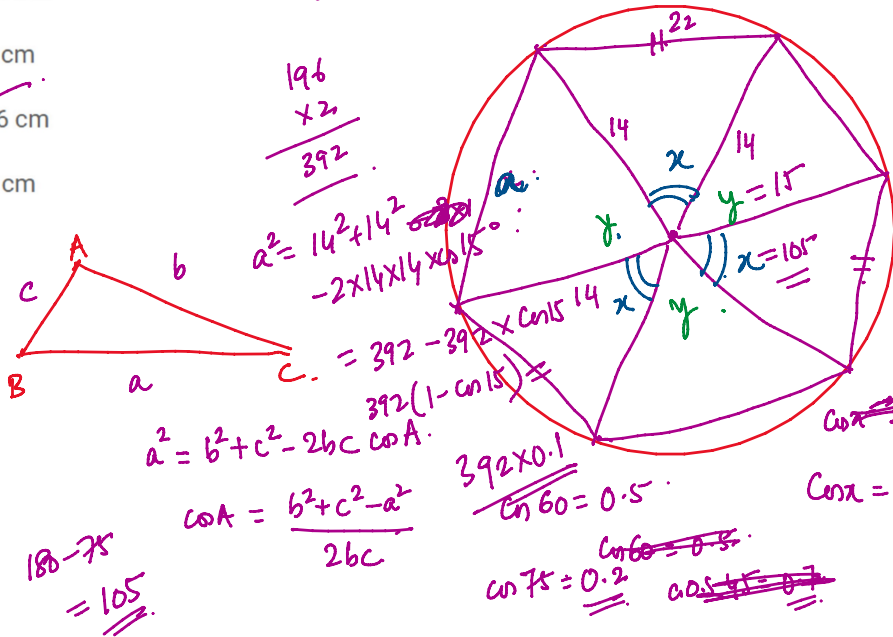$$= 4 \times \dfrac{\pi r^2}{4} = \pi r^2$$

$$= \pi \times (6.3)^2.$$

**Q :** A hexagon is inscribed in a circle of radius 14 cm, three of its alternates sides are 22 cm and each and other sides are equal find the length of other three sides?

(A) 14 cm

(B) 8 cm

(C) 26 cm

(D) 4 cm

$\cos 15 = \cos(45-30) = \cos 45 \cos 30 + \sin 45 \sin 30 = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2} = \frac{\sqrt{3}+1}{2\sqrt{2}} = \frac{1.7+1}{2\times1.4} = \frac{2.7}{2.8}$

$3x + 3y = 360$    $=0.7$

$x + y = 0.120$

$196 \times 2 = 392$

$a^2 = 14^2 + 14^2 - 2\times14\times14 \times \cos 15°$

$= 392 - 392 \times \cos 15$

$392(1 - \cos 15)$

$392 \times 0.1$

$\cos 60 = 0.5$

$\cos 75 = 0.2$

$a^2 = b^2 + c^2 - 2bc \cos A$

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$180 - 75$

$= 105$

**Cosine Rule**

$\cos x = \frac{14^2 + 14^2 - 22^2}{2\times14\times14}$

$= \frac{392 - 484}{2\times14\times14}$

$\cos x = -0.8$

$\cos x = -\frac{23}{98} = 0$   $= -0.2$

$= -\frac{9246.23}{2\times14\times14}$

$x = 180 - 40 = 40$   $7$

---

**Q :** The angle of elevation of the foot of a house from the top of a tower is twice the angle made with the top of this house. If the height of the tower is 75 meters. And the elevation angle of the foot of the house from the top of the tower is 60 degrees. So what is the height of the house?

(A) 25 meter

(B) 37.5 meter

(C) 50 meter

(D) 60 meter

Tower    House

$75 - h$

$60° = 2a$

$\sqrt{3} = \tan 60 = \frac{75}{d}$

$d = \frac{75}{\sqrt{3}}$

$\frac{1}{\sqrt{3}} = \tan 30° = \frac{75 - h}{d}$

$\frac{d}{\sqrt{3}} = \frac{75}{3} = 25$

$\frac{d}{\sqrt{3}} = 75 - h$

$25 = 75 - h$

$h = 50$

---

**Q :** 39 persons can repair a road in 12 days, working 5 hours a day. In how many days will 30 persons, 6 hours a day, complete the work?

(A) 11

(B) 13

(C) 15

(D) 17

Time & work

Const $= \frac{\text{Total}}{\text{work}} = $ No of people $\times$ No of days $\times$ No of hrs.

$39 \times 12 \times 5 = 30 \times N \times 6$

$N = \frac{39 \times 12 \times 5}{30 \times 6} = 13$

(D) 17

$$N = \frac{\overset{13}{\cancel{39}} \times \overset{2}{\cancel{12}} \times \cancel{8}}{\cancel{30} \times \cancel{6}} = 13.$$

Q : If $\dfrac{\sin \theta \, \cosec \theta}{\tan \theta} = 4$ then Find the value of tan θ ?

(A) 4

(B) $\dfrac{1}{4}$ ✓

(C) 3

(D) 5

$$\frac{1}{\tan \theta} = 4$$

$$\tan \theta = \frac{1}{4}$$

$$\cosec \theta = \frac{1}{\sin \theta}.$$

$$\sin \theta \, \cosec \theta = 1$$

Memorize Squares of
numbers from 1 to 32
cubes of nos from 1 to 15