

① Find the least number which when divided by 8, 14, 20, 25 and leaves 4 as remainder in each case.

$$\rightarrow \text{LCM of } (8, 14, 20, 25) + 4$$

$$= 2^3 \times 5^2 \times 7 + 4$$

$$= 1400 + 4$$

$$= 1404$$

② By reducing the selling price of an article by 250 dollars, a gain of 5% turns into a loss of 5%. Find the original selling price of the article.

$$\rightarrow \text{CP} = 100x$$

$$\text{SP} = 105x$$

$$105x - 50 = 95x$$

$$10x = 50$$

$$x = 5$$

$$\text{Original SP} = 105x$$

$$= 105 \times 5$$

$$= 525$$

③ If $\frac{3}{5}$ th of a number exceeds its $\frac{2}{7}$ th by 44, find the number.

→ consider the number is 'x'

$$\therefore \frac{3}{5}x - \frac{2}{7}x = 44$$

$$\therefore \frac{21x - 10x}{5 \times 7} = 44$$

$$\therefore 11x = 44 \times 5 \times 7$$

$$\therefore x = \frac{44 \times 5 \times 7}{11}$$

$$\therefore x = 4 \times 5 \times 7$$

$$\therefore x = 140$$

∴ The number = 140.

④ Abhimanyu weights 56.7 kg. If he reduces his weight in the ratio 7:6. Find his new weight.

→ Original weight = 56.7 kg

$$\text{new weight} = \frac{56.7 \times 6}{7}$$

$$= 48.6 \text{ kg}$$

⑤ Tanmaya was asked to multiply a given number by $\frac{4}{5}$. By mistake, he divided the number by $\frac{4}{5}$. His answer was 36 more than the correct number. What was the given number?

→ consider given number = x

Tanmaya was asked to multiply a given number by $\frac{4}{5}$

by mistake, he divided the number by $\frac{4}{5}$

$$\therefore \frac{5}{4}x - \frac{4}{5}x = 36$$

$$\therefore \frac{25x - 16x}{20} = 36$$

$$\therefore 25x - 16x = 36 \times 20$$

$$\therefore 9x = 36 \times 20$$

$$\therefore x = \frac{36 \times 20}{9}$$

$$\therefore x = 4 \times 20$$

$$\therefore x = 80$$

\therefore The given number = 80

⑥ On selling 33 meters of cloth, Vishal obtains a profit equal to the selling price of 11 meters of same cloth. Find the profit percentage?

→ let 1m costs ₹ 1 / ₹ n

$$S.P = ₹ 33$$

$$P = ₹ 11$$

$$C.P = ₹ 22$$

$$P\% = \frac{11}{22} \times 100$$

$$= 50\%$$

$$\begin{aligned} \textcircled{7} \quad & x^3 - x^2 + ax + x - a - 1 \\ & x^2(x-1) + a(x-1) + 1(x-1) \\ & (x-1)(x^2 + a + 1) \end{aligned}$$

⑧ Each interior angle of a regular polygon is 144° . Find the interior angle of a regular polygon which has double the number of sides as in the first polygon. ③

⇒ Each angle of a regular polygon: $\frac{(n-2) \times 180}{n} = 144$

$$\frac{(n-2) \times 180}{n} = 144$$

$$\frac{(n-2)}{n} = \frac{4}{5}$$

$$5n - 10 = 4n$$

$$n = 10$$

∴ $n = 20$ ∵ sides are doubled.

Each angle = $\frac{(n-2) \times 180}{n}$

$$= \frac{18 \times 180}{20} = 162.$$

⑨ Area of a square is 16 cm^2 . Find the area of the square joining the mid points of the sides.

→ Area of square = a^2

$$\therefore 16 = a^2$$

$$\therefore a = 4$$

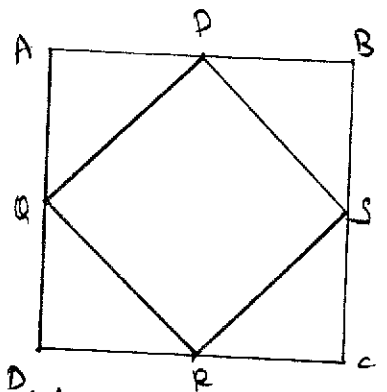
$$x = \sqrt{2^2 + 2^2} = \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$$

∴ Area of the square joining the mid points = x^2

$$= (2\sqrt{2})^2$$

$$= (4 \times 2)$$

$$= 8 \text{ cm}^2.$$



⑩ Factorize $2x^2 - 17xy + 26y^2$

$$= 2x^2 - 17xy + 26y^2$$

$$= 2x^2 - 4xy - 13xy + 26y^2$$

$$= 2x(x - 2y) - 13y(x - 2y)$$

$$= (2x - 13y)(x - 2y).$$

① Divide $x^4 - y^4$ by $(x - y)$

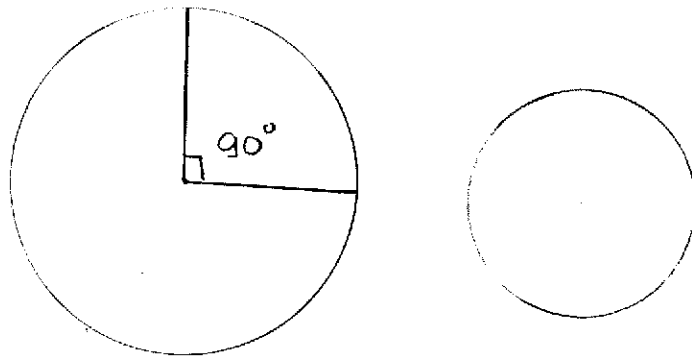
$$= \frac{x^4 - y^4}{(x - y)}$$

$$= \frac{(x^2 + y^2)(x^2 - y^2)}{(x - y)}$$

$$= \frac{(x^2 + y^2)(x + y)\cancel{(x - y)}}{\cancel{(x - y)}}$$

$$= (x^2 + y^2)(x + y)$$

② The first figure given below shows a wire in circular shape with the radius of 80 cm. Shyam cut out an arc from wire such that the arc makes an angle of 90° at the centre. If this arc is again bent in circular shapes as shown in the second picture. Find the radius of the new circle.



$$\rightarrow \text{arc length} = \frac{\theta}{360} \times 2\pi r$$

$$= \frac{90}{360} \times 2\pi \times 80$$

$$= 2\pi \times 20$$

$$= 40\pi$$

\therefore circumference of the circle = $2\pi r$

$$\therefore 2\pi r = 40\pi$$

$$\therefore r = \frac{40\pi}{2\pi}$$

$$\therefore r = 20$$

\therefore Radius of new circle = 20 cm

⑬ If line PR & ST are parallel to each other, find the value of angle x .

→ $\angle R = \angle I$ (corresponding \angle)

In ΔPQR

$$\angle P + \angle Q + \angle R = 180$$

$$\therefore \angle P = 100^\circ$$

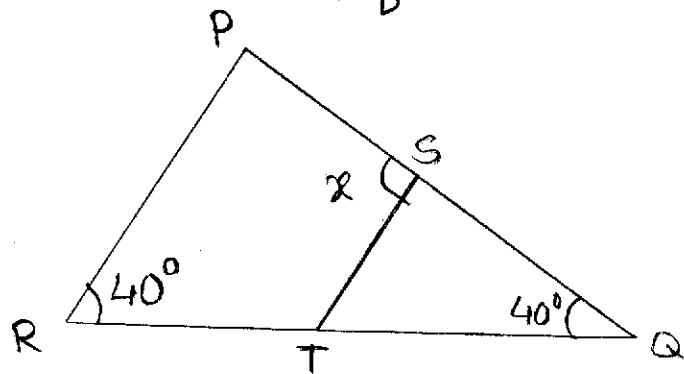
$\therefore PR \parallel ST$

$\therefore \angle P + \angle S = 180^\circ$ Interior angle of \parallel line

$$\therefore \angle S = 180^\circ - 100^\circ$$

$$\therefore \angle S = 80^\circ$$

\therefore measure of angle $x = 80^\circ$

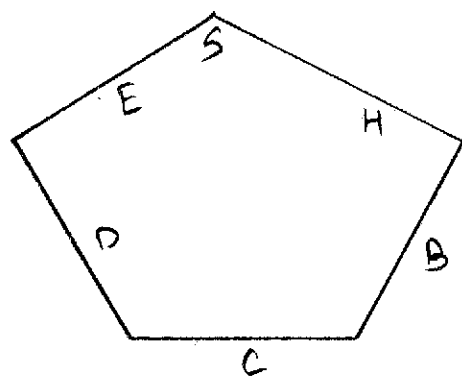


⑭ A cat is walking on the periphery of a regular polygon, as shown below, if it starts from point S, in the clock wise direction, which side will the cat reach after walking $\frac{18}{25}$ distance on the periphery?

→ let length of one side is 1cm

\therefore Periphery of polygon = 5cm

$$\therefore \frac{18}{25} \text{ of } 5 = 3.6 \text{ cm.}$$



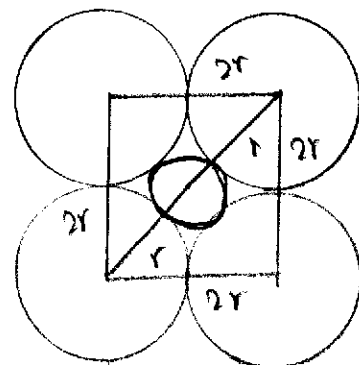
⑮ In the image given below, if the radius of all the large circles is r , then what is the radius of the inner smaller circle?

→ Let radius of smaller circle be 'a'

$$2\sqrt{2}r = 2r + 2a$$

$$\sqrt{2}r = r + a$$

$$a = r(\sqrt{2} - 1)$$



⑥ In a family, the father took $\frac{1}{4}$ of the cake and he had 3 times as much as others had. The total number of family member is.

$$\begin{aligned} \text{Each other family member had} &= \frac{\frac{1}{4}}{3} \\ &= \frac{1}{12} \end{aligned}$$

$$\therefore \text{father had } \frac{1}{4} \text{th, left} = \frac{3}{4}$$

$$\therefore \text{No. of family members} = \frac{\frac{3}{4}}{\frac{1}{12}}$$

$$= \frac{3}{4} \times \frac{12}{1}$$

$$= 3 \times 3$$

$$= 9$$

$$\therefore \text{Total family member is} = 9 + 1$$
$$= 10$$

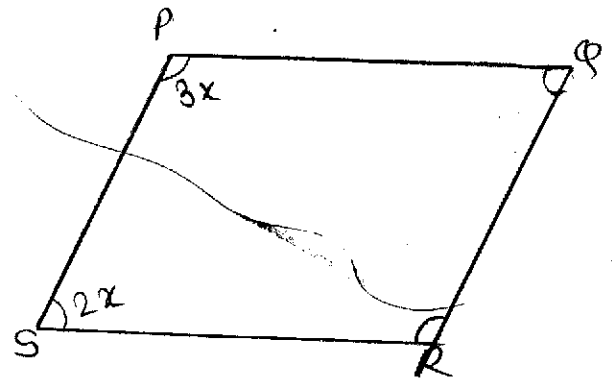
$$\begin{aligned}
 (17) \text{ factorize } & (a+b)(x+y) + (2a+3)(x+y) - (3a+4b)(x+y) \\
 &= (a+b)(x+y) + (2a+3)(x+y) - (3a+4b)(x+y) \\
 &= (x+y) [(a+b) + (2a+3) - (3a+4b)] \\
 &= (x+y) [a+b+2a+3-3a-4b] \\
 &= (x+y) [\cancel{3a} - 3b - \cancel{3a} + 3] \\
 &= (x+y) [-3b+3] \\
 &= 3(x+y) [-b+1] \\
 &= 3(x+y)(1-b)
 \end{aligned}$$

(18) Two adjacent angles of a parallelogram are in the ratio of 2:3 find the measures of all the angles of the parallelogram.

$$\begin{aligned}
 \rightarrow 2(2x+3x) &= 360 \\
 5x &= 180 \\
 \therefore x &= 36
 \end{aligned}$$

$$\begin{aligned}
 \therefore 2x &= 2 \times 36 = 72 \\
 \therefore 3x &= 3 \times 36 = 108
 \end{aligned}$$

\therefore The measures of angles of the parallelogram = $72^\circ, 108^\circ$
 $72^\circ, 108^\circ$



(19) Find the largest four digit number which is exactly divisible by 459.

\rightarrow Let largest four digit number = 9999
 9999 is exactly divisible by 459

$$\begin{aligned}
 &= 9999 - 360 \\
 &= 9639
 \end{aligned}$$

$$\begin{array}{r}
 459 \overline{) 9999} \quad (21) \\
 \underline{- 918} \\
 819 \\
 \underline{- 459} \\
 360
 \end{array}$$

② In what time will the simple interest on a certain sum of money at $\frac{25}{4}\%$ per annum be $\frac{3}{8}$ th of itself?

$$I = \frac{PNR}{100}$$

$$\frac{3}{8}P = \frac{P \times N \times \frac{25}{4}}{100}$$

$$N = 6.$$

② Simplify : $23x - [15y - \{4y - 2(3x - 2y) - 3(3x - 2x - y)\}]$

$$\begin{aligned} &= 23x - [15y - \{4y - 6x + 4y - 3(3x - 2x + y)\}] \\ &= 23x - [15y - \{8y - 6x - 3x - 3y\}] \\ &= 23x - [15y - \{5y - 9x\}] \\ &= 23x - [15y - 5y + 9x] \\ &= 23x - [10y + 9x] \\ &= 23x - 10y - 9x \\ &= 14x - 10y \end{aligned}$$

23. Three cubes of silver with edges 3cm, 4cm & 5cm are melted and recast into single cube. Find the cost of entire surface of new cube with gold at the rate of 350 ₹ per sq. cm.

$$\Rightarrow V = S_1^3 + S_2^3 + S_3^3$$

$$S^3 = 3^3 + 4^3 + 5^3$$

$$S^3 = 27 + 64 + 125$$

$$S^3 = 216$$

$$S^3 = 6^3$$

$$S = 6$$

$$23(a) \left(\frac{x^m}{x^n}\right)^{m+n} \times \left(\frac{x^n}{x^k}\right)^{n+k} \times \left(\frac{x^k}{x^m}\right)^{k+m}$$

$$\left(x^{m-n}\right)^{m+n} \times \left(x^{n-k}\right)^{n+k} \times \left(x^{k-m}\right)^{k+m}$$

$$x^{m^2-n^2+n^2-k^2+k^2-m^2}$$

$$x^0 = 1$$

$$(b) \frac{1}{1+x^{m-n}} + \frac{1}{1+x^{n-m}}$$

$$\frac{1}{1+x^m \times x^{-n}} + \frac{1}{1+x^n \times x^{-m}}$$

$$\frac{1}{1+\frac{x^m}{x^n}} + \frac{1}{1+\frac{x^n}{x^m}}$$

$$\frac{x^n}{x^n+x^m} + \frac{x^m}{x^m+x^n}$$

$$\frac{x^n+x^m}{x^n+x^m} = 1$$

24) Divide ₹ 1200/- into two parts such that SI on first part for 2 years at 6% p.a is equal to the simple interest on the second part for 3 years at 8% p.a

$$\Rightarrow \begin{array}{c} 1200 \\ \swarrow \quad \searrow \\ I_1 \quad = \quad I_2 \end{array}$$

$$\frac{P \times R}{100} = \frac{P \times R}{100}$$

let principle be x .

$$x \times 2 \times 6\% = (1200 - x) \times 3 \times 8\%$$

$$x \times 2 \times 6\% = (1200 - x) \times 3 \times 8\%$$

$$x = 2(1200 - x)$$

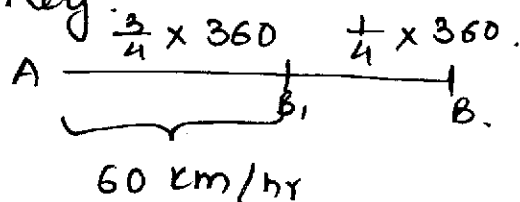
$$x = 2400 - 2x$$

$$3x = 2400$$

$$x = 800.$$

25) Shyam completes a journey of 360 km/hr in $5\frac{3}{4}$ hr by a car. If he covers the first three fourth of the journey at 60 km/hr. Find speed of car for the balance of the journey.

$$\Rightarrow S = \frac{d}{t}$$



$$S = \frac{360}{23/4}$$

$$S = \frac{360 \times 4}{23}$$

what number should be added to each of the number 3, 5, 13 and 19 so that resulting number may be in proportion.

$$26) \frac{3+x}{5+x} = \frac{13+x}{19+x}$$

$$(3+x)(19+x) = (13+x)(5+x)$$

$$3(19+x) + x(19+x) = 13(5+x) + x(5+x)$$

$$57 + 3x + 19x + x^2 = 65 + 13x + 5x + x^2$$

$$57 + 22x = 65 + 18x$$

$$22x - 18x = 65 - 57$$

$$4x = 8$$

$$\boxed{x = 2}$$

27) The following graph gives the marks scored by a student in different subjects. English, Hindi, mathematics, science and social science in an examination. Assuming that the total marks obtained for the examination are 540, answer the questions below-

1) The marks scored in English, science and social science exceeds the marks scored in Hindi and mathematics by: How much?

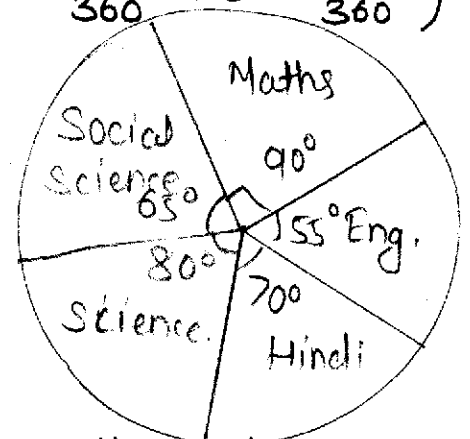
$$\rightarrow \left(\frac{55 \times 540}{360} + 80 \times \frac{540}{360} + 65 \times \frac{540}{360} \right) - \left(70 \times \frac{540}{360} + 90 \times \frac{540}{360} \right)$$

$$= \frac{3}{2} [80 + 55 + 65 - 70 - 90]$$

$$= \frac{3}{2} [200 - 160]$$

$$= \frac{3}{2} \times 40$$

$$= 60$$



2) The marks scored in Hindi and mathematics exceeds the marks scored in Hindi English and social science by how much?

$$\rightarrow \frac{3}{2} [70 + 90 - 55 - 65]$$

$$= \frac{3}{2} [160 - 120]$$

$$= \frac{3}{2} \times 40$$

$$= 60$$

3) The subjects in which the students scored 105 marks is.

$$\rightarrow H = \frac{3}{2} \times 70$$
$$= 105$$

4) The subject in which marks obtained are 22.2% is

$$\rightarrow S = \frac{80^{\cancel{40}} \times 100^{\cancel{5}}}{\cancel{360}}$$
$$= \frac{200}{9}$$
$$= 22.2\%$$

5) The difference of marks between English and Science is the same as

\rightarrow Difference in marks of English and Science = 25°

\therefore There is no other subjects of same difference

28) A wall 4.84m long and 3.1m high is to be covered both sides with rectangular tiles of size 22cm x 10cm. Find the total cost of the tiles at the rate of ₹ 12 per tile.

$$\rightarrow \frac{4.84 \times 3.1 \times 2}{22 \times 10 \times 10^{-2} \times 10^{-2}}$$

$$\text{No. of tiles} = \frac{484}{100} \times \frac{81}{10} \times \frac{2 \times 100 \times 100}{22}$$

$$= \frac{484 \times 620}{12}$$

$$= 22$$

29) After allowing a discount of 10% on M.P, a shopkeeper charges ₹ 540 for a watch. Had he not allowed any discounts, he would have made a profit of 20%. What was the C.P. of the watch?

M.P	C.P
100	90
x	540

$$\therefore x = \frac{540 \times 100}{90}$$

$$M.P = 600 \text{ Rs}$$

$$P = \frac{100 \times P}{C.P}$$

$$20 = \frac{100 \times (600 - x)}{x}$$

$$x = 5 \times 600 - 5x$$

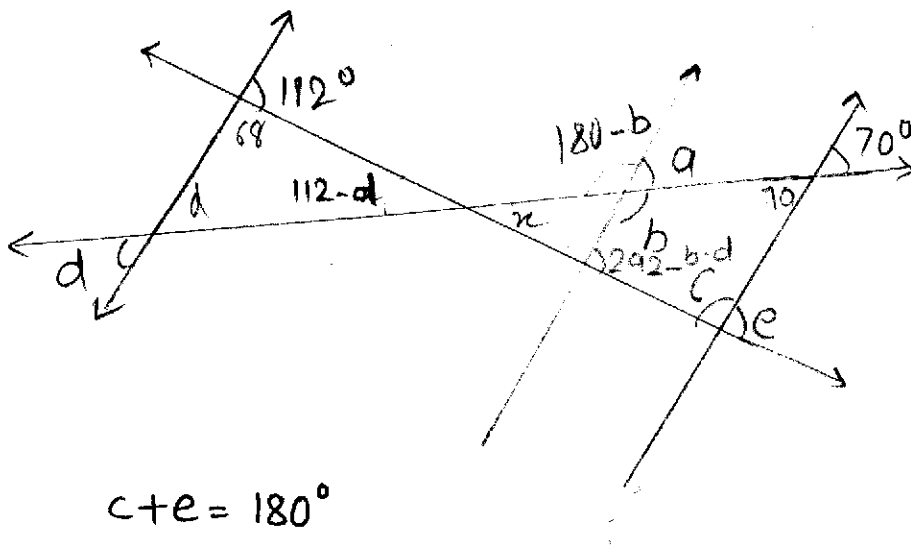
$$6x = 5 \times 600$$

$$x = \frac{5 \times 600}{6}$$

$$x = 500$$

\therefore C.P. of watch = 500 ₹

30) Find the measure of each lettered angle.



$$\rightarrow c + e = 180^\circ$$

$$a + b = 180^\circ$$

$$\therefore 70 + b + c + 292 - b - d = 360$$

$$\therefore 362 + c - d = 360$$

$$\therefore c - d = -2.$$

$$\therefore a = 70^\circ$$

$$b = 180^\circ - 70^\circ$$

$$\therefore b = 110^\circ$$

$$\therefore 70 + b + c + 112 = 360$$

$$\therefore 70 + 110 + c + 112 = 360$$

$$\therefore c + 292 = 360$$

$$\therefore c = 360 - 292$$

$$\therefore c = 68^\circ$$

$$\therefore e = 180^\circ - 68^\circ$$

$$\therefore e = 112^\circ$$

$$\therefore d = c + 2$$

$$\therefore d = 68^\circ + 2$$

$$\therefore d = 70^\circ$$