CSS 2023

Q6(a) A telephone company charges initially Rs 0.50 and then Rs 0.11 for every minute. Write an expression that gives the cost of a call that last N minutes.

Sol:-

A telephone company charges initially. Rs 0.50

Then charges for every minute = Rs 0.11

Cost of call for one minute

$0.5 + 0.11 \times 1$

Cost of call for two minutes

$0.5 + 0.11 \times 2$ (or $0.5 + 0.11 + 0.11$)

Cost of call for three minutes

$0.5 + 0.11 \times 3$

Cost of call for N minute

$0.5 + 0.11N$

(B) Series

(i) 1, 8, 4, 27, 9 ?

$1^2, 2^3, 2^2, 3^3, 3^2, 4^3$

64

(ii) 3, 6, 8, 16, 18, ?, 36

$\times 2$ $\times 2$ $\times 2$

(i) 2, 8, 512, ?

2^3 8^3 512^3

2, 8, 512, 134,217,728

Explain the logic in detail in the form of statements

(iv) 81, 9, 64, 8, ?, 12

9^2 8^2 12^2

81, 9, 64, 8, 144, 12

(v) 6, 11, 21, 36, 56, ?

+5 +10 +15 +20 +25

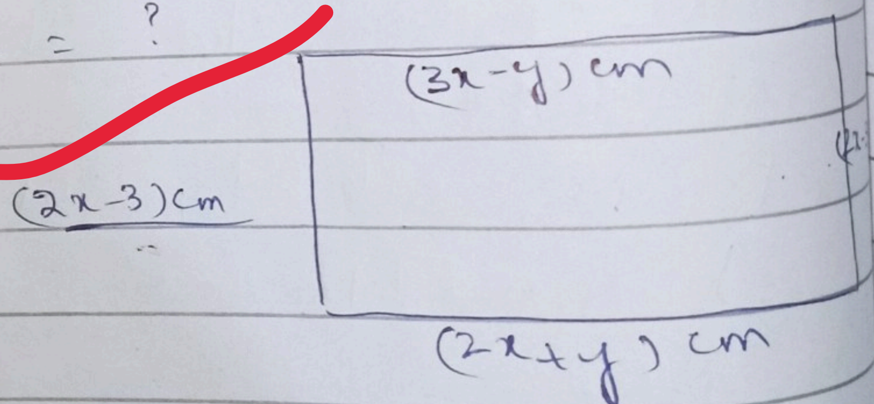
6, 11, 21, 36, 56 → 81

(c) The Perimeter of the retangle given below is 114cm. Find area of retangle.

Sol:-

Perimeter = 114cm

Area = ?



opposites sides of rectangle are equal

Perimeter = Sum of all sides

$114 = 3x - y + 2x + y + 2x - 3 + 2x - 3$

$= 9x - 6$

$9x = 114 + 6$

$9x = 120$

$\boxed{x = \frac{120}{9}}$ $\Rightarrow$ x 13.3 cm

$y = ?$ opposites sides of Rect

$3x - y = 2x + y$

$3x = 2x + y + y$

$3x - 2x = 2y$

$x = 2y$

$\frac{x}{2} = y$

By Putting value of x

$\frac{120/9}{2} = y$ / $\frac{120}{9 \times 2} = y$

$\frac{120}{18} = y$

$\boxed{y = \frac{20}{3}}$

Length of rectangle $= 2x + y$

$= 2\left(\frac{120}{9}\right) + \frac{20}{3}$

$= \frac{240 + 60}{9}$

$= \frac{300}{9} = \frac{100}{3}$

Width of Rect $= 2x - 3$

$= 2\left(\frac{120}{9}\right) - 3$

$= \frac{240 - 27}{9} = \frac{\overset{71}{\cancel{213}}}{\underset{3}{\cancel{9}}} = \left(\frac{71}{9}\right.$

Area of Rectangle $= L \times w$

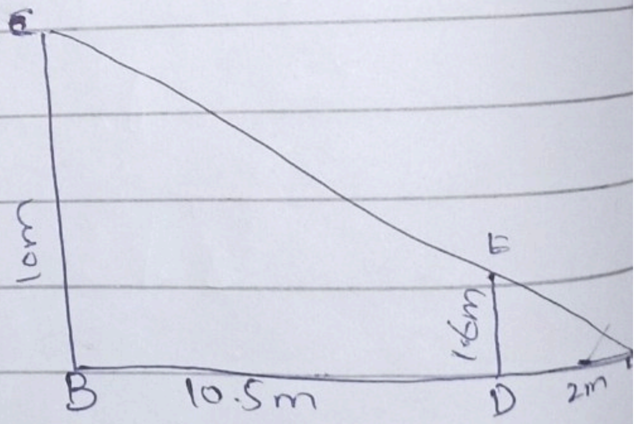
$= \dfrac{100}{3} \times \dfrac{71}{3}$

$$\boxed{\text{Area of Rec} = \frac{7100}{9}}$$

Simplify it and write the final answers in the form of statements

(d) Ahmed stands at Point D, 2m in front of a spotlight at point A. He is 1.6m tall and is facing the wall of a building which is 10.5m away from him. How tall (BC) is his shadow on the wall of the building.

Sol:-



B 10.5m 2m A

= 12.5m

There are two equiangular triangle namely ΔABC and ΔADE

Note = For two equiangular triangle the ratio of any two corresponding sides is always same.

$$\frac{BC}{12.5} = \frac{1.6}{2}$$

$$BC = \frac{1.6 \times 12.5}{2}$$

$$BC = \frac{\cancel{8}\cancel{16} \times \cancel{125}}{\cancel{10} \times \cancel{2} \times \cancel{10}} = 10$$

$$\boxed{BC = 10m}$$

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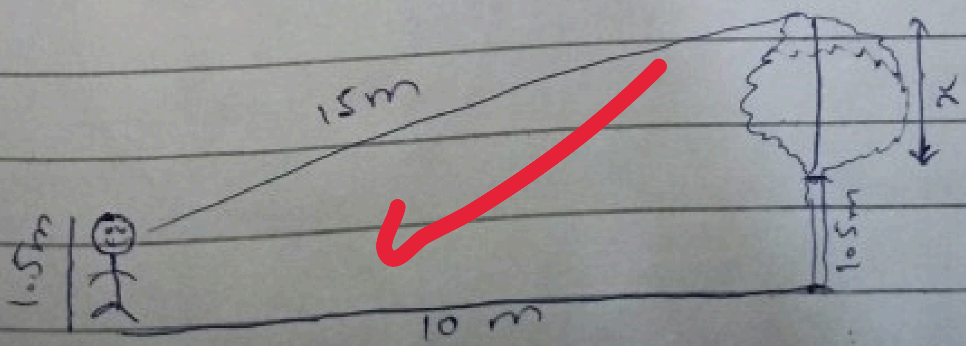
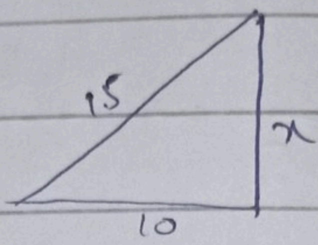
Q7(a) Ali is standing 10 meters away from a tree. The distance of his eyes from his feet is 1.5 meter. Given that the distance from his eyes to the top of a tree is 15 meters. Find the height of the tree.

Sol:-



Height of tree $= 1.5m + x$ —(1)

By using pathagoras theorm



$c^2 = a^2 + b^2$

$(H^2 = B^2 + P^2)$

$15^2 = 10^2 + x^2$

$225 = 100 + x^2$

$x^2 = 225 - 100$

$x^2 = 125$

$\sqrt{x^2} = 5\sqrt{\cancel{2}5}$ —(2)

$x = 5\sqrt{5}$

Put value of x in equ (1)

Height of tree $= 1.5m + 5\sqrt{5}$

$= \frac{\cancel{15}^{3}}{\cancel{10}_{2}} m + 5\sqrt{5}$

$= \frac{3}{2} + 5\sqrt{5}$

$= \frac{3 + 5\sqrt{5}}{2} m$

$= 12.68$

b) Jumbled words

LNUGEF ENGULF

CKANS SNACK

CIREFE FIERCE

EERAANMOGTP POMEGRANATE

MNIKPPU PUMPKIN

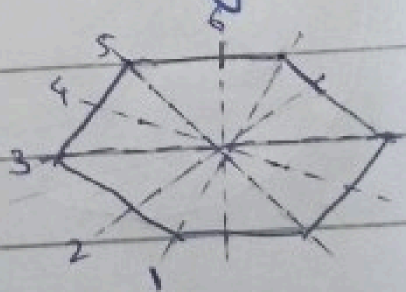
(C) Draw and Write total number of lines of symmetry in a regular hexagon and octagon. How many Lines of symmetry are there in a circle

Sol:-

Lines of symmetry: It is a line that divides a shape into two equal and

Note: Any regular polygon with "n" number of sides will have "n" lines of symmetry.

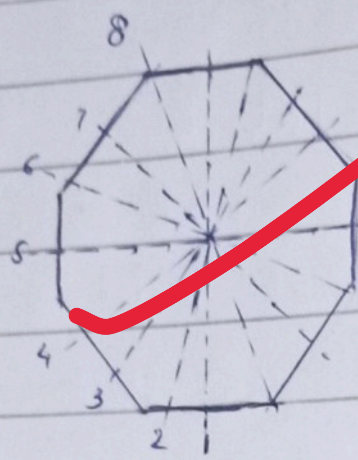
Regular Hexagon: 6 sides



A regular hexagon has 6 lines of symmetry

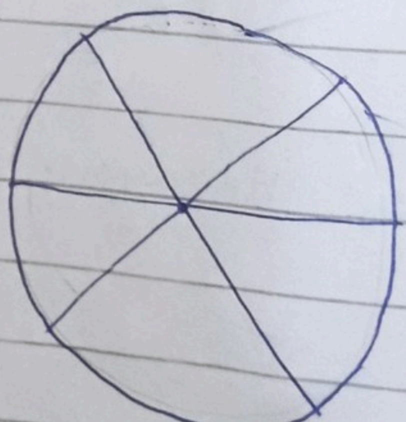
8 sides

Regular octagon:



A regular octagon has 8 lines of Symmetry.

Circle Every line passing through centre of circle is a line of Symmetry. So, a circle has infinite number of lines of Symmetry.



(d) The height of Egyptian pyramid is 146.6 meters and base length is 230.6 meters. Find volume of that pyramid.

Sol:-

volume of pyramid

$$V = \frac{lwh}{3}$$

Given that

$h = 146.6m$

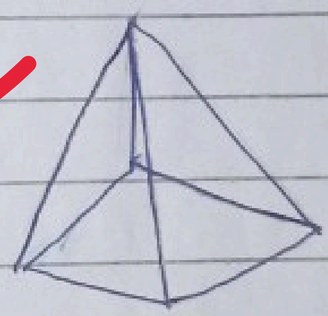
$l = 230.6m$

Note: The Egyptian pyramid has a Square base

then

$L = W$

$W = 230.6m$



$$V = \frac{230.6 \times 230.6 \times 146.6}{3}$$

$$V = \frac{7795654.38m^3}{3}$$

$$V = 2,598,551.46m^3$$

volume of pyramid of Egypt is $2,598,551.46m^3$

(ii) Even Number

$N(A) = 2, 4, 6, 8, 10, 12 \rightarrow N(A) = 6$

$N(S) = 12$

$P(A)_{\text{(even Number)}} = \frac{N(A)}{N(S)}$

$P(A) = \frac{6}{12}$

$\boxed{P(A) = \frac{1}{2}}$

(iii) Perfect square

$n(A) = 1, 4, 9$

$n(S) = 12$

$P(A)_{\text{(Pefect square)}} = \frac{N(A)}{N(S)}$

$P(A) = \frac{3}{12}$

$\boxed{P(A) = \frac{1}{4}}$

(iv) A Negative Number

There is no negative number in Sample space

$N(A) = 0$

$N(S) = 12$

$P(A)$ (Negative N) $= \frac{P \cdot N(A)}{N(S)}$

$P(A) = \frac{0}{12}$

$\boxed{P(A) = 0}$

(v) Number less than 13

$N(A) = 12$

$N(S) = 12$

$P(A)$ (Number less than 13) $= \frac{N(A)}{N(S)}$

$P(A) = \frac{12}{12}$

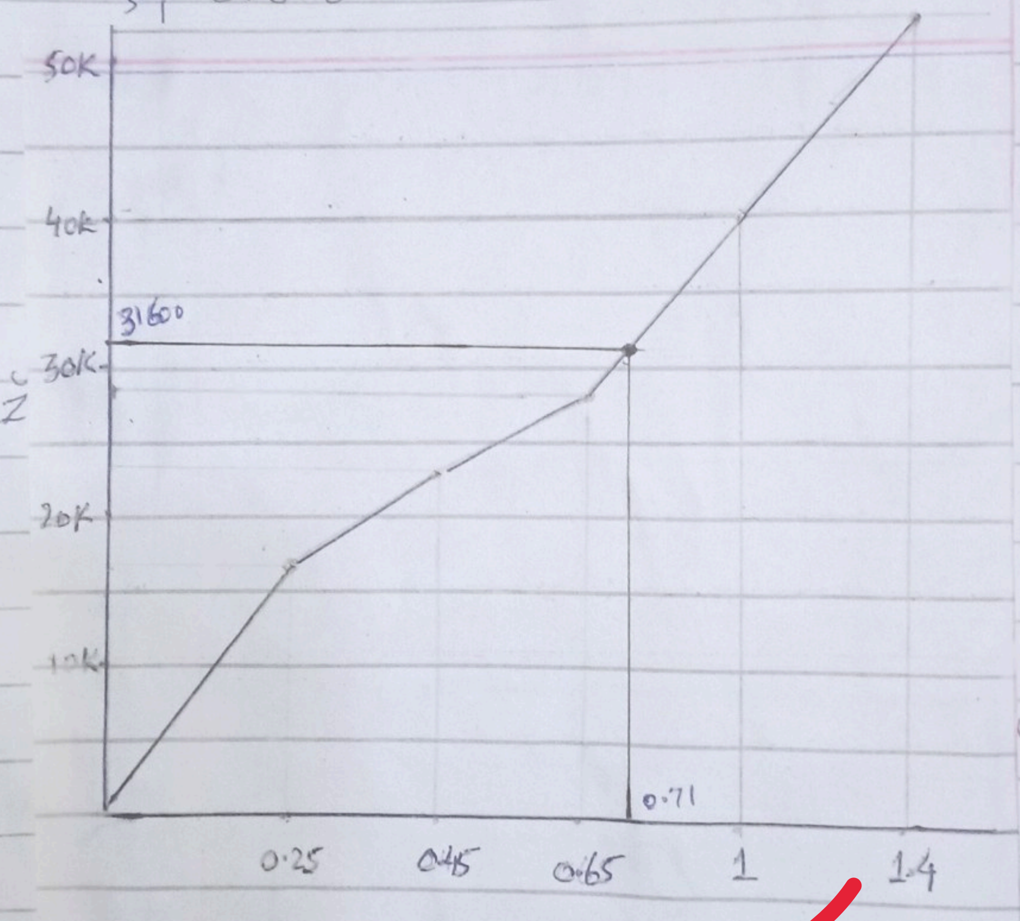
$\boxed{P(A = 1}$

c) The scintillation nuclear radiation dectector detects the alpha rays per second. When the energy of the alpha rays $(E\alpha)$ in MeV increases, the number of counts (Nc) on the detector also increases linearly as shown in the table below.

α Mev)	0.25	0.45	0.65	1	1.4
c	17500	23500	29500	40000	52000

Sol:-

raw a graph of N_c as a function Ea(Mev) and find the energy of unknown alpha ray if the number of counts are of 31600



$$\frac{0.35}{10000} = 0.000035$$

1 → 0.000035

1600 → 1600×0.000035

→ 0.056

0.706 → 0.71

(d) The y is directly proportional to x^2 and $y = m$ for a particular value of x. Find an expression for y in terms of m, when the value of x is doubled.

Sol:-

$$y \propto x^2$$

$$y = cx^2 \quad -(1) \qquad (c = \text{constant})$$

$y = m$ For a particular value

Let suppose $x = a$

$$m = ca^2$$

$$\boxed{c = \frac{m}{a^2}}$$

If particular value of x is doubled

$$x = a$$

$$x = 2a$$

$$y = cx^2$$

$$y = \frac{m}{a^2} \times (2a)^2$$

$$y = \frac{m \times 4 \times \cancel{a^2}}{\cancel{a^2}}$$

$y = 4m$ Require Expression

or

- As y is directly proportion to square of x, that is
  $y \propto x^2$ or $\boxed{y = kx^2}$
  (k is constant of proportionality)

- For particular value x, y = m, we have $m = kx^2$ or $\boxed{k = \frac{m}{x^2}}$

- When x is doubled ($y = kx^2$)
  $y = k(2x)^2$ By putting value of k
  $y = \frac{m}{\cancel{x^2}}(4\cancel{x^2})$

  $y = 4m$

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