Probability

→ Number of chances < No ⇕ yes

→ Total outcomes / Total event

→ Required event / Desired outcome

$$\text{Prob} = \frac{\text{Required event}}{\text{Total outcome}}$$

Prob → Whole Number (0, 1)

↳ Decimal

↳ Fraction form

↳ % age

$\Rightarrow \frac{1}{2} = 0.5 = 50\%$

→ Most probably it will rain today

→ The chances are high that the prices of petrol go up

→ I doubt that pak...

$$\text{Prob} = \frac{\text{Req. outcome}}{\text{Total outcome}}$$

$$P_{max} = 1, \qquad P_{min} = 0$$

$$\text{Range} \Rightarrow (0 - 1)$$

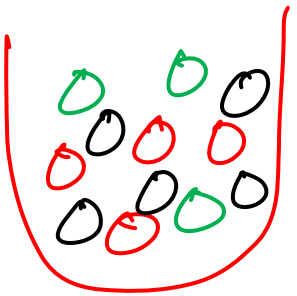
$$\boxed{0 \leq P \leq 1}$$

1. General Questions ✓
2. Coins
3. DICE
4. Cards

A bag contains 4 red balls, 3 greens and 5 black ball. A ball is drawn at random from the bag. Find the probability that the ball is drawn is

1. black ball, 2. Not black

At Random



Total outcomes = $4+3+5=12$

A = Black Ball = 5

$$P(A) = \frac{5}{12}$$

B = (G + R) = 3 + 4 = 7

$$P(B) = \frac{7}{12}$$

Classification of blood groups is based on the presence or absence of inherited antigenic substances on the surface of red blood cells. In a survey of British population the blood group distribution among 1000 people was as follows: 300 had blood group A, 325 had blood group B, 250 had O and 125 AB. Out of this group a person was selected at random, calculate his probability of having blood group AB. (CSS)

Total outcomes = 1000

AB = 125

$$P(AB) = \frac{125}{1000} = 0.125 = 12.5\%$$

Coin/Dice/Cards

Coin → Total outcomes = 2^n

n → No. of coin

n → frequency / Repeat

$n = 1$, Total outcomes = $2^1 = 2 = [H, T]$

$n = 2$, Total outcomes = $2^2 = 4$

$[HH, TT, HT, TH] \Rightarrow (4)$

Three coins / single but tossed thrice

$n = 3$

Total outcomes $= 2^3 = 8$

[HHH, TTT, HHT, THH, TTH, HTT

HTH, THT]

What is the probability if a coin is thrown.

Tot. outcomes = 2

[H, T]

$P(H) = \frac{1}{2} = 0.5$

$= 50\%$

$P(T) = \frac{1}{2} = 0.5$

$= 50\%$

On tossing a coin twice, what is the probability of getting only one tail?

Twice = n = 2, Tot. outcomes = 4

[HH, TT, HT, TH]

A = only one Tail = [HT, TH]

= 2

$P(A) = \frac{2}{4} = \frac{1}{2} = 0.5$

$= 50\%$

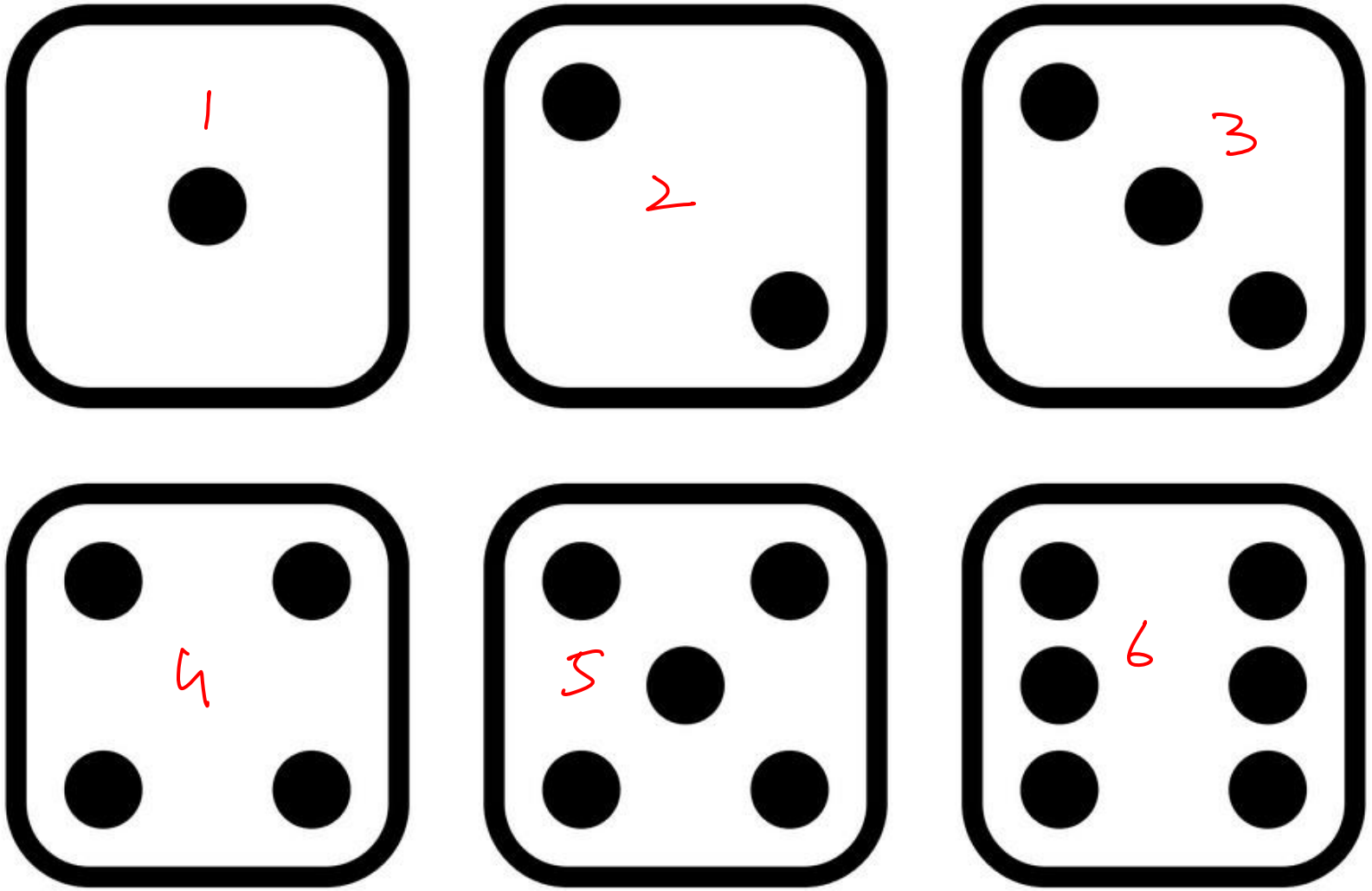
Three coins tossed once, the probability of at least two heads.

Tot. outcomes = 8 = [HHH.....

A = At least two Heads :

[HHH, HHT, THH, HTH] = 4

$$P(A) = \frac{4}{8} = \frac{1}{2} = 0.5 = 50\%$$



Total outcomes $= 6^n$, $n \rightarrow$ No. of Dices

$n \rightarrow$ Repetition (freq)

$n = 1$

Total outcomes $= 6^1 = (1, 2, 3, 4, 5, 6)$

Even $= 2, 4, 6 = (3)$, $P(E) = \frac{3}{6} = \frac{1}{2}$

odd $= 1, 3, 5 = (3)$, $P(O) = \frac{3}{6} = \frac{1}{2}$

prime $= (2, 3, 5) = (3)$, $P(P) = \frac{3}{6} = \frac{1}{2}$

Two Dice / Twice $n = 2$

Total outcomes $= 6^2 = 36$

$(1,1), (1,2), (1,3), (1,4), (1,5), (1,6)$

$(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)$

$(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)$

$(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)$

$(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)$

$(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)$

Q = When two dices are rolled what is the probability to get sum of an even number?

Sum = 2, 4, 6, 8, 10, 12

$S_2 = (1)$

$S_4 = (3^{\checkmark})$

$S_6 = (5^{\checkmark})$

$S_8 = (5^{\checkmark})$

$S_{10} = (3^{\checkmark})$

$S_{12} = (1^{\checkmark})$

$1+3+5+5+3+1$

$= 18$

$P(S=E) = \frac{18}{36}$

$= \frac{1}{2}$

What is the possibility of a number less than 5 when a die is rolled.

When two dice are rolled simultaneously. What is probability that the sum of outcome will be 7.

Total outcomes = 6

$N<5 = [1, 2, 3, 4) = 4$

$P(N<5) = \frac{4}{6} = \frac{2}{3}$

$= 0.66$

$= 66\%$

Total outcomes = 36

Sum = 7 $(3+4), (4+3)$

$D_1 + D_2 = 7$

$1 + 6 = 7$

$6 + 1 = 7$

$2 + 5 = 7$

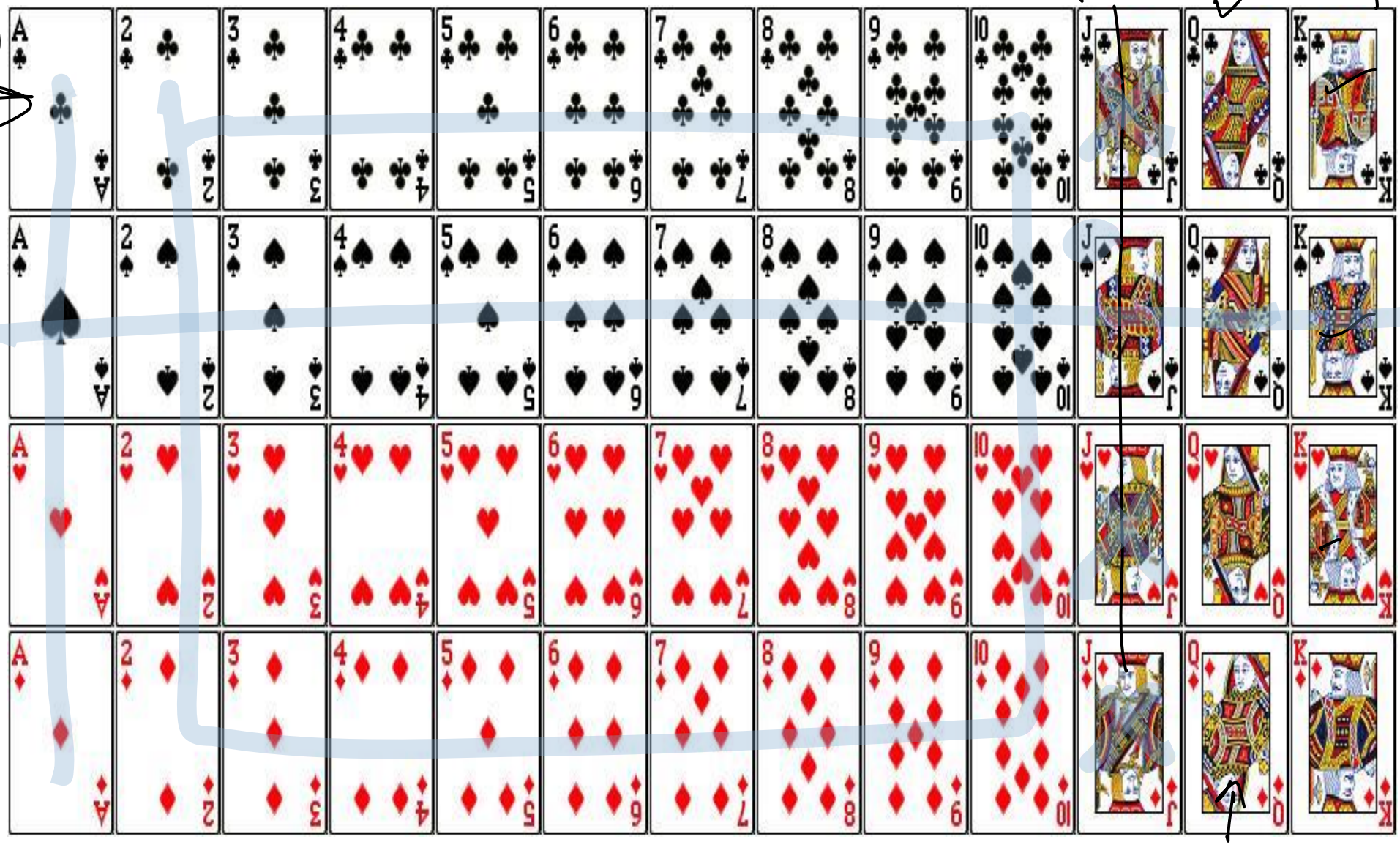
$5 + 2 = 7$

$P(S=7) = \frac{6}{36}$

$= \frac{1}{6}$

Non-Face cards = 40

12



Total cards = 52

- 26 (B)
  - 13 club
  - 13 spade
- 26 (R)
  - 13 Heart
  - 13 Diamond

Face cards :-

12
- 6 Black
- 6 Red

- 4 J
  - 2B
  - 2R
- 4 Q
  - 2B
  - 2R
- 4 K
  - 2B
  - 2R

Non-face cards = 40

20B 20R

2R 2B

4 A's (Aces)

40 <

36 Number cards:

18B 18R

Alphabetical cards = 12 Face cards + 4 A's = 16

A card is drawn from a well shuffled pack of cards. Find the probability of

a. A jack $P(J) = 4/52 = \frac{1}{13}$

b. A king of red color $P(K=2) = 2/52 = \frac{1}{26}$

c. A king or queen $P(K+Q) = \frac{8}{52}$

d. A non-faced card $P(d) = \frac{40}{52}$

e. Neither a spade nor a jack

spade = 13(X)
jack = 3(X)
= 16 X

$P(e) = ?$

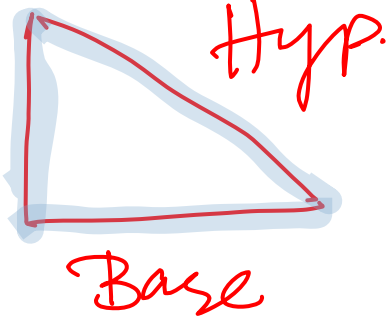
$P(e) = \frac{36}{52} = \frac{9}{13}$ ✓

Geometry

1. statement → shape → simplify
2. Formulas → Area, height, perimeter etc
3. properties → characteristics

① Right Angle Triangle:

→ Shape ⇒ par

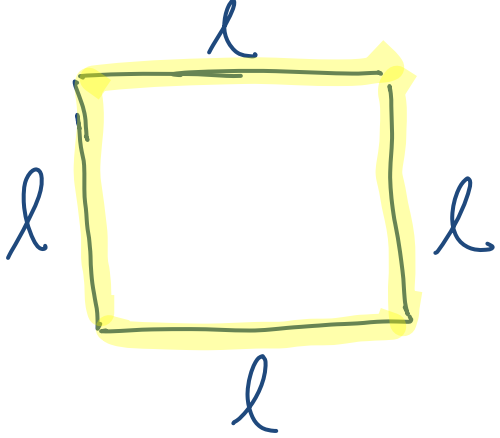


→ Formula = $A = \frac{1}{2} B \times P$, Pyth = $H^2 = B^2 + P^2$

Perimeter = $B + P + H$

→ properties: legs < Base, Per

(2) Square:-



Formula = $A = l \times l = l^2 \Rightarrow \sqrt{A} = \sqrt{l^2}$

$l = \sqrt{A}$

→ Perimeter = $l + l + l + l$

$= 4l \Rightarrow \frac{P}{4} = l$

Properties: → All sides must be equal

→ opposite sides → Parallel.

③ Rectangle:-

Factorize

$$A = l \times w$$

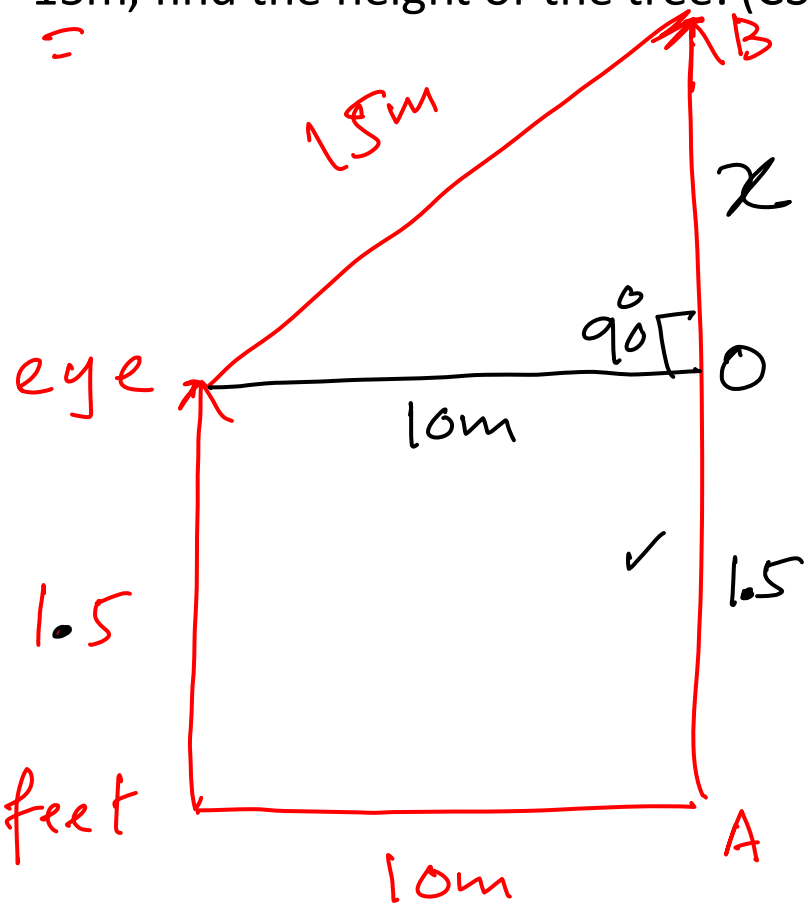
A

$$\text{Perimeter} = l + l + w + lw = 2l + 2w$$

$$P = 2(L + w) \Rightarrow \frac{P}{2} = L + w$$

Properties: opposite sides must be equal & parallel.

Ali is standing 10meters away from a tree. The distance of his eyes from his feet is 1.5m. Given that the distance from his eyes to the top of the tree is 15m, find the height of the tree. (CSS)



$A \to B$ = Tree Height

$A \to B = A \to O + O \to B$

$= 1.5 + x$

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

$P^2 = H^2 - B^2$

$P = \sqrt{15^2 + 10^2} = \sqrt{225 - 100}$

$P = \sqrt{125} = 11.18$

$A \to B = 1.5 + 11.18$

$= 12.68\ m$

Calculate the total area and perimeter of the given shape (CSS)

$H^2 = B^2 + P^2 \Rightarrow B = \sqrt{H^2 - P^2} \Rightarrow B = \sqrt{225 - 144}$

$B = \sqrt{81} = B = 9\,cm$

$Sq(1) = A = 12^2 = 144\,cm^2$

$Sq(2) = A = 9^2 = 81\,cm^2$

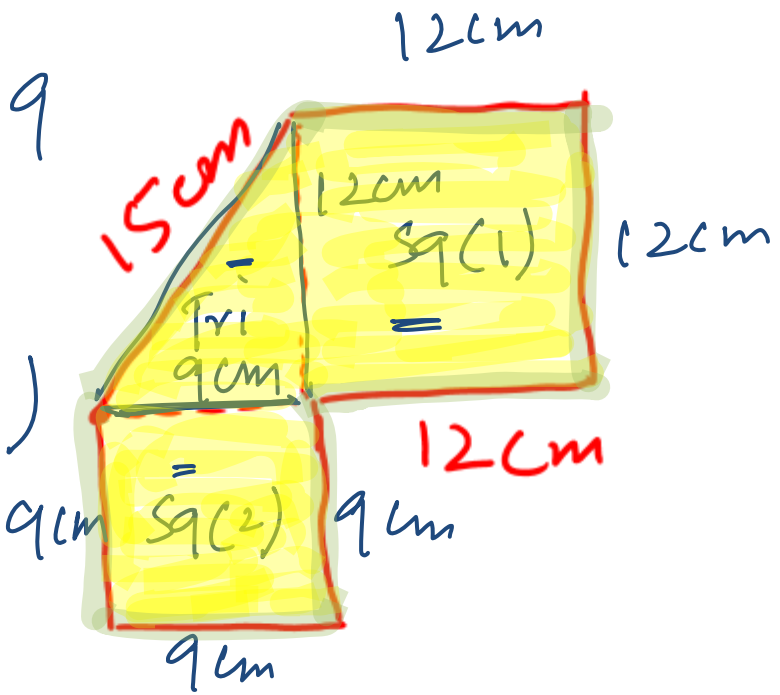
$Tri = A = \frac{1}{2} B \times P = \frac{1}{2} \times 12 \times 9$ (6)

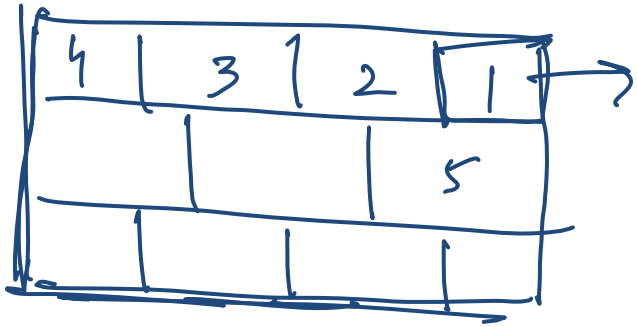
$A = 54\,cm^2$

Total Area = $144 + 81 + 54 = (\quad)$

Perimeter: $12 + 12 + 12 + 15 + 9 + 9 + 9$

$= (\quad)\,cm$





A(wall) = B1 + B2 + ...
= No. of Brick × Aver Brick

W(length) = ( ) m ⇒ A(wall) = □

W(Height) = ( ) m

Brick → Dimension : L × W = A(Brick) = ○

No. of Bricks = $\frac{A(wall)}{A(Brick)}$ =

The perimeter of the rectangle given below is 114cm. Find the area of the rectangle. (CSS)

$P = 2(L + w) \Rightarrow \frac{P}{2} = L + w$

$\frac{114}{2} = 3x - y + 2x - 3 \Rightarrow 57 = 5x - y - 3$

$(3x - y)\,cm = l_1 = (\quad)$

$57 + 3 = 5x - y$

$60 = 5x - y$

eq (1)

$A = L \times w$

$A = (\quad) \times (\quad)$

$(2x - 3)\,cm = w$

$(\quad)$

$(2x + y)\,cm = l_2 = (\quad)$

Rectangle → opposite sides must be equal.

$l_1 = l_2$

$3x - y = 2x + y$

$3x - 2x = y + y$

$x = 2y$ — (2)

put in eq (1)

$5x - y = 60$ — (1)

$5(2y) - y = 60$

$10y - y = 60$

$9y = 60, \quad y = \frac{60}{9}$

$y = 6.6$

$x = 2y$

$x = 2(6.6)$

$x = 13.2$

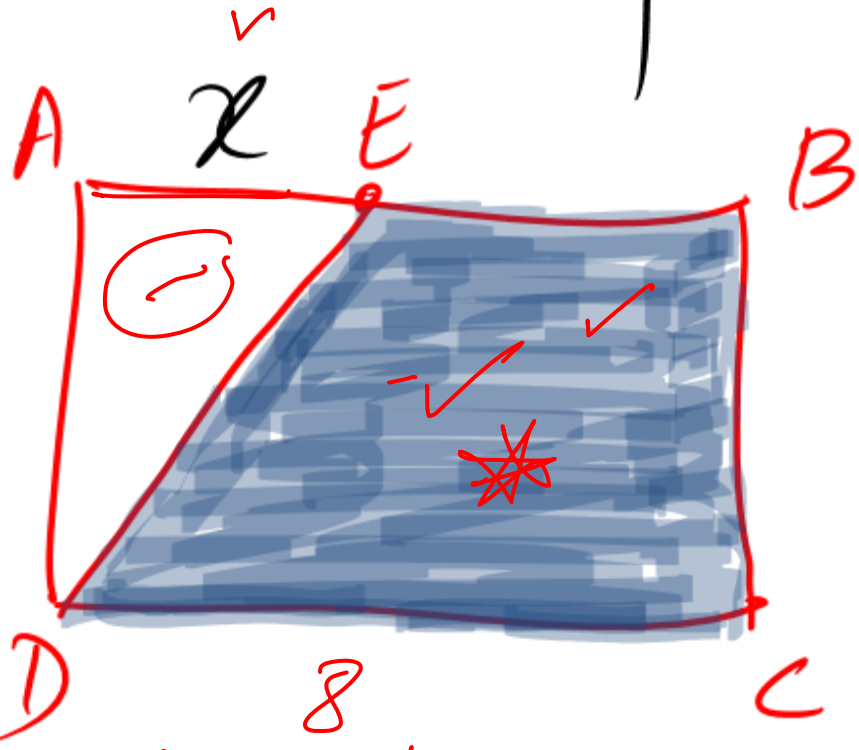
$l_1 = 3x - y = (\quad)$

$l_2 = 2x + y = (\quad)$

$w = 2x - 3 = (\quad)$

$A = L \times w =$ 

In the figure below, given that $AD = 6$, $CD = 8$, $AE = x$, what is the area of shaded region?



$R(A) = 6 \times 8 = 48$

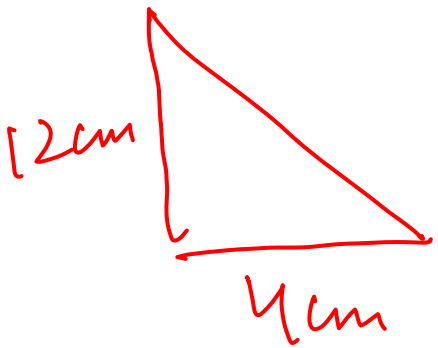
$T(A) = \frac{1}{2} 6 \times x = 3x$

Shaded Region

$= R(A) - T(A) = 48 - 3x$ Ans

Aslam is willing to use the stylish ceramics tiles in the lounge of his under-construction house. The shape of the tile is a right triangle, having the lengths of two legs of 12cm and 4cm. Each tile costs Rs. 15. How much will it cost to fill the lounge of 8 meters length and 6 meters width with these tiles? (CSS)

Shape of Tile =

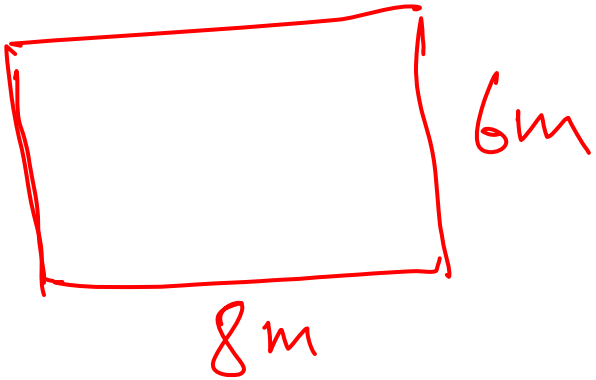


Rs = 15, Tot. Cost = ?

Area of Tile =

$A = \frac{1}{2} \times 4cm \times 12cm$

$A = 24cm^2$



$A(L) = 8 \times 6 = 48m^2$

Unit Conversion:

$A(L) = 48\,(m \times m)$ $\quad \therefore m^2 = m \times m$

$= 48\,(100cm \times 100cm)$

$= 480{,}000\,cm^2$ — (2)

$$\text{No. of Tiles} = \frac{A(L)}{A(T)} = \frac{480{,}000\,cm^2}{24\,cm^2}$$

$= 20{,}000/-$

Cost price $= 15 \times 20{,}000 = 3$ lacs

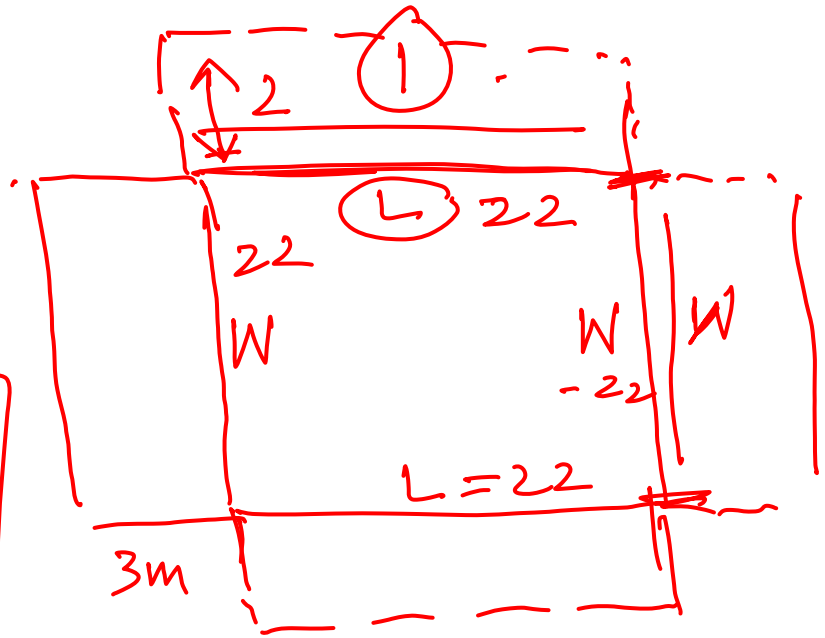
A farmer needs to build a boundary wall around his farm. If the area of the farm is 484m2, what will be the total area of the wall if it is two meters high on three sides ad three meters high on one side? (CSS)

$A = 484 = L \times W$

$\sqrt{A} = l$

$\sqrt{484} = l$

$22m = l$



$W(1) = 22 \times 2$

$= 44m^2$

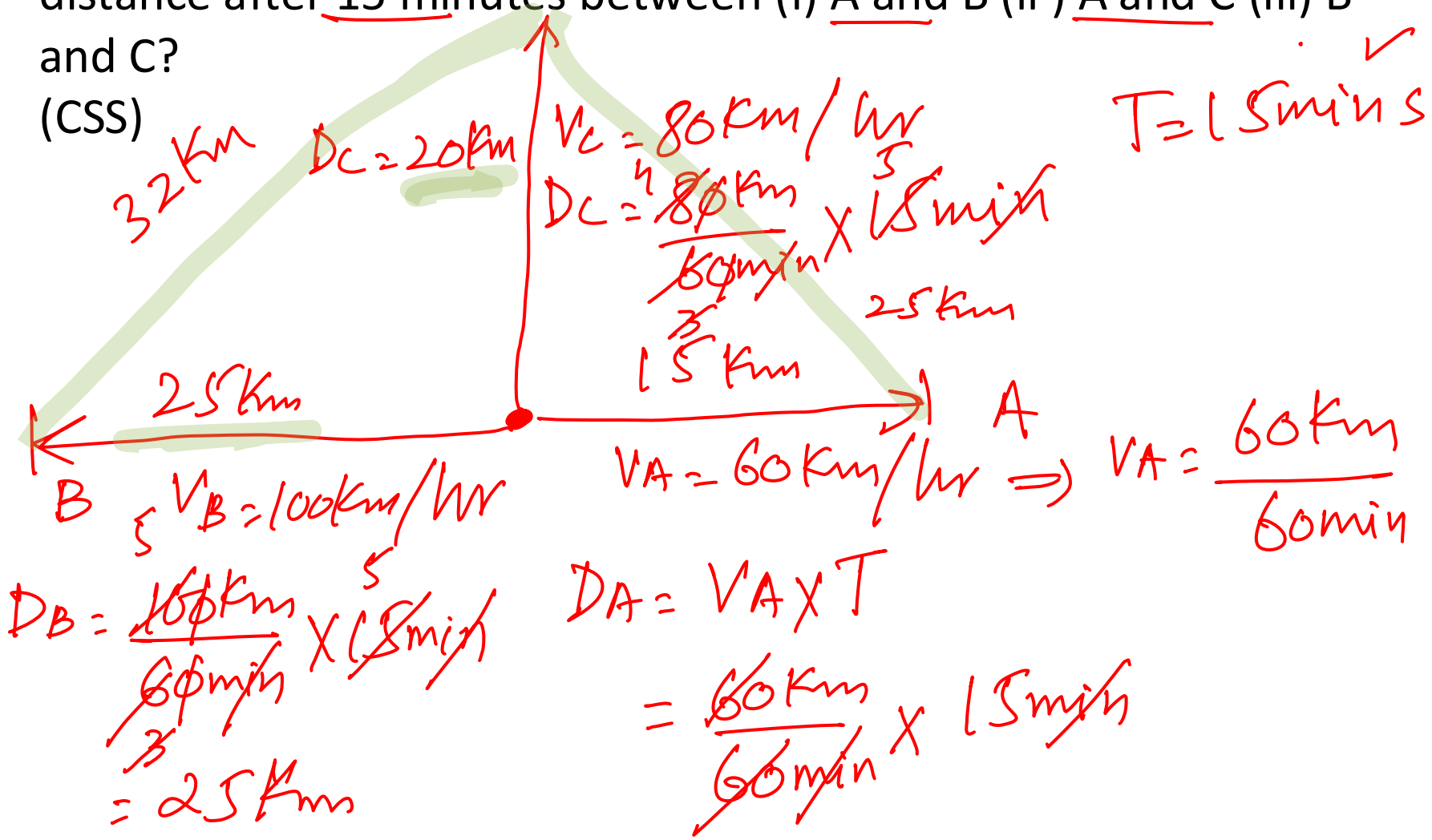
$W(2) = 44m^2$

$W(3) = 44m^2$

$W(4) = 3 \times 22 = 66m^2$

There are three cars and start moving in such a way that car A and B are moving opposite with speed 60 and 100 km/h. Car C is moving perpendicularly to both with speed 80 km/h. What is distance after 15 minutes between (i) A and B (ii) A and C (iii) B and C?

(CSS)



$A \rightarrow B = 40\,km$

$A \rightarrow C = H = \sqrt{15^2 + 20^2}$

$= 225 + 400$

$1024 = 32^2$

$= \sqrt{625} = \sqrt{25^2}$

$= 25\,km$

$B \rightarrow C = H = \sqrt{25^2 + 20^2} = \sqrt{625 + 400}$

$H = \sqrt{1025} = \underline{\underline{32\,km}}$