Geometrical construction

Q1. By geometrical construction, it is possible to divide a line segment in ratio $\sqrt{3} : \frac{1}{\sqrt{3}}$.

Soln: Given: $\sqrt{3} : \frac{1}{\sqrt{3}}$

multiply by $\sqrt{3}$, we get $3:1$

both are (+ve) integer. So it is possible to divide a line segment.

Q2. Draw a line segment of 7 cm. Divide it in the ratio 3:5.

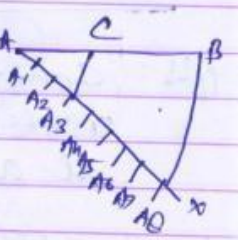
Steps of construction: (i) Draw a line segment AB of 7cm

(ii) Draw an acute angle $\angle BAX$.

(iii) Along Ax mark 8 equal points.

(iv) Join A8B.

(v) From A_3 draw $A_3C \parallel A8B$.



Q3. Draw a $\triangle ABC$ in which $BC = 12cm$, $AB = 5cm$, $\angle B = 90°$ construct a $\triangle$ similar to it whose sides are $\frac{2}{3}$ of corresponding sides of first $\triangle$.

Steps of construction:

(i) Draw a line of 12 cm

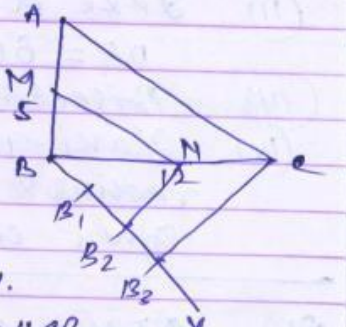
(ii) Draw an acute $\angle CBY$

(iii) Draw a $\triangle ABC$ of given measurement.

(iv) Cut 3 equal parts on BY.

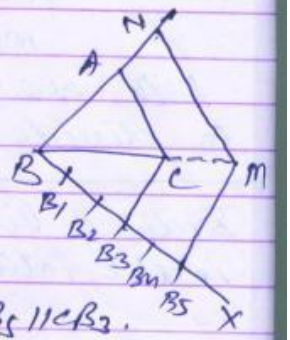
(v) Join CB_3 and draw $NB_2 \parallel CB_3$.

(vi) Again draw $MN \parallel AC$. So, $\triangle MBN$ is our required similar $\triangle$.



Q4. Draw a $\triangle ABC$ in which $BC = 6$ cm $CA = 5$ and $AB = 4$ cm. Construct a $\triangle$ similar to it and of scale factor $5/3$.

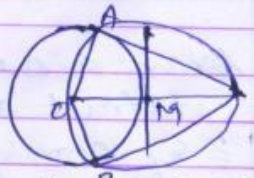
Steps of construction:



(I) Draw a $\triangle ABC$ of given measurment.
(II) Draw an acute $\angle CBX$
(III) Cut 5 equal parts on BX.
(IV) Join CB_3 and draw $MB_5 \parallel CB_3$.
(V) Again draw $MN \parallel CA$.
$\therefore NBM$ is our required $\triangle$.

Q5. Construct a tangent to a circle of radius 4 cm from a point which at a distance of 6 cm from its centre.

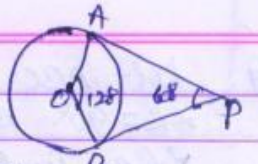
Steps of construction:



(I) Draw a circle of radius 4 cm.
(II) Take a point P from O such that $OP = 6$ cm.
(III) Bisect OP at M.
(IV) Taking M as centre and $MO = PM$ as radius draw a circle which intersect given circle at A & B. Join PA & PB.

Q6. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60°.

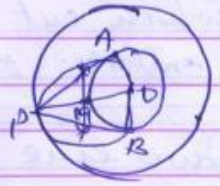
Steps of construction:



(I) Draw a circle of radius 5cm.
(II) Draw an $\angle AOB = 120^\circ$.
(III) At A and B draw right angle which intersects at P. Join PA & PB.
$\therefore \angle APB = 60^\circ$.

Q7. Construct a tangent to a circle of radius 4cm from a point on concentric circle of radius 6cm and measure its length.

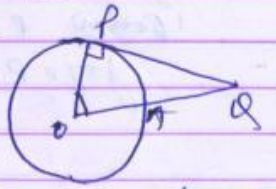
Steps of ~~concentre~~ construction:



(I) Draw a concentric circle of radii 4cm & 6cm.
(II) Take a point P and join OP.
(III) Bisect OP at M and take M as centre and radius PM = OM which cuts given circle at A and B. Join PA & PB. which are required tangent.

Q8. Draw a circle of radius 6cm. Draw a tangent to this circle making an angle of 30° with a line passing through the centre.

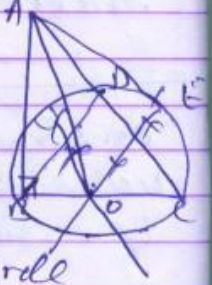
Steps of construction:



(I) Draw a circle of radius 6cm.
(II) Draw an angle $\angle POA = 60^\circ$.
(III) At P draw right angle which cuts OA at Q. So PQ is required tangent.

Q9. Let ABC be a △ with AB = 3 cm, BC = 4 cm and ∠B = 90°. BD is perpendicular from B on AC. The circle through B, C, D is drawn. Construct tangents from A to the circle.

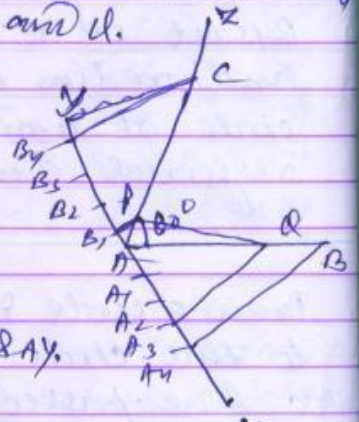
Steps of construction



(i) Draw a right triangle ABC with given measurement.
(ii) Draw BD perpendicular to AC.
(iii) Bisect BC, CD which cuts at O.
(iv) Join AO, Bisect and draw a circle which cut given circle at B & E. Join AB and AE. AB, AE are required tangents.

Q10. Two line segments AB and AC include an angle of 60°, AB = 5 cm, AC = 7 cm. Locate P & Q on AB & AC such that AP = $\frac{3}{4}$ AB and AQ = $\frac{1}{4}$ AC. Join P and Q.

Steps of construction:



(i) Draw a line AB = 5 cm
(ii) Draw angle ∠BAX = 60°.
(iii) Draw ∠BAX & ∠BAY.
(iv) cut 4 equal parts on AX & AY.
(v) Join B_4C and BAY and Draw $PB_3 \parallel B_4C$ and $BA_4 \parallel A_3Q$. Join PQ.

PROBABILITY

Q1. what is prob. of sure event?
Ans. 1

Q2. what is the prob. of impossible event
Ans. 0.

Q3. If $P(E) = 0.05$ find $P(\text{not } E)$

Ans $P(E) + P(\text{not } E) = 1$
$0.05 + P(\text{not } E) = 1$
$P(\text{not } E) = 1 - 0.05$
$= \boxed{0.95}$ Ans

Q4. Find the prob. of getting black queen from a well shuffled pack of card

Soln: no. of black queen = 2
Total cards = 52
P(black queen) = $\frac{\text{no. of fav. outcome}}{\text{Total outcome}}$
$= \frac{2}{52}$
$= \boxed{\frac{1}{13}}$ Ans

Q5 What is the probability of getting head when two coins are toss
Ans. P(no head) = $\frac{1}{4}$.
(HH, TT, TH, HT).

Q6. Find the prob. of getting neither a red card nor a queen from 52 playing car

Ans. Total outcomes = 52
no. of red cards = 26
no of queen of black card = 2
Total cards ~~no of fav. outcomes~~ = 26+2 = 28
no. of fav. outcomes = 52 - 28 = 24

$$P = \frac{24}{52} = \frac{6}{13}$$ Ans.

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6. Find the prob. that product is prime no. if two dice are thrown.

Ans.

Possible ways = (1,2) (2,1) (1,3) (3,1) (5,1) (1,5)

no. of ways = 6

Required prob. = $\frac{6}{36} = \frac{1}{6}$ Ans.

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7. From A, B, C, D, E, A, find the prob. of getting A and A.

Ans. $P(A) = \frac{2}{6} = \frac{1}{3}$

$P(D) = \frac{1}{6}$ Ans.

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8. Find the prob. of getting at least one tail from tossing two coins.

Ans. {HH, HT, TH, TT}

Total = 4, no. of fav. outcomes = 3

P(at least one tail) = $\frac{3}{4}$ Ans.

Q9. A die is thrown once. Find the prob of getting a no. lying between 2 & 6.

Ans. $\{1, 2, 3, 4, 5, 6\}$

no. of fav. outcomes = 3

Total outcomes = 6

$P(E) = \frac{3}{6} = \frac{1}{2}$ Ans

Q10 what is the prob of getting a no. 4 of throwing a die.

Ans. $\{1, 2, 3, 4, 5, 6\}$

no. of fav. outcomes = 1

Total outcomes = 6

$\boxed{P(4) = \frac{1}{6}}$ Ans

Q11. Three coins are tossed. Find the prob of getting (i) exactly two heads (ii) at least two tails

Ans. $S = \{(HHH), (HHT), (HTH), (THH), (HTT), (THT), (TTH), (TTT)\}$

Total = 8

(i) exactly two heads = 3

$P(\text{two H}) = \frac{3}{8}$

(ii) at least two tails = 4

$P(\text{at least two tails}) = \frac{4}{8} = \frac{1}{2}$

Ans

Q12. A bag contains 5 black, 7 red and 3 white balls. A ball is drawn from bag at random. Find prob. that ball drawn is black or white.

Ans. $\boxed{P(\text{black or white}) = \frac{8}{15}}$ Ans.

Q13. In a single throw of a pair of dice, what is the prob. of getting a total of 9 or 11.

Ans. fav. outcomes = (3,6) (6,3) (4,5), (5,4) (5,6) (6,5)
= 6

Total = 36

$\boxed{P(9 \text{ or } 11) = \frac{6}{36} = \frac{1}{6}}$ Ans.

Q14. Cards numbered from 11 to 60. Find the probability of getting a perfect square no.

Ans. Perfect Sq. no. = 16, 25, 36, 49,
no of fav. outcomes = 4
Total no. = 50

$\boxed{P(\text{perfect Sq no}) = \frac{4}{50} = \frac{2}{25}}$ Ans

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Q15. Find the prob of getting 53 sundays in a leap year.

Ans. Leap year = 366 = 52×7+2

A leap year has always 52 Sundays
Remaing two days can be

(S, M) (M, T) (T, TH) (TH, F) (F, Sat) (Sat, S)

Here fav outcomes = 2
Total = 7

Required prob = $\frac{2}{7}$ Ans

Q16. Find the prob. of getting a prime no. when a die is thrown once.

Ans $S = \{1, 2, 3, 4, 5, 6\}$

no. of fav outcomes = 3
Total " = 6

$P(\text{prime no}) = \frac{3}{6} = \frac{1}{2}$ Ans

Q17. If prob of success is 63% what is the prob of failure?

Ans.

$P(E) + P(\text{not } E) = 1$

Let E = success = $\frac{66}{100}$ % = 66
$= 0.66$

$0.66 + P(\text{not } E) = 1$

$P(\text{not } E) = 1 - 0.66$

$P(\text{not } E) = 0.34$ Ans

18. In a throw of pair of dice find the prob. of getting a doublet.

Ans. (1,1) (2,2) (3,3) (4,4) (5,5) (6,6)

There are 6. and Total = 36

required prob. = $\boxed{\frac{6}{36} = \frac{1}{6}}$ Ans.

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9. A die is thrown twice. What is the prob. that 5 will come up at least once.

Ans.

no. of fav. Outcomes = (1,5) (2,5) (3,5) (4,5) (5,1) (5,2) (5,3) (5,4) (5,5) (5,6) (6,5) = 11.

Total = 36

$\boxed{\text{required prob.} = \frac{11}{36}}$ Ans.

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10. A bag contains 5 red balls and some blue balls. If the prob. of drawing a blue ball is thrice that of a red ball find no. of blue balls.

Sol'n: Let no. of blue balls = x

Total balls = x+5

$P(B) = \frac{x}{x+5}$ and $P(R) = \frac{5}{x+5}$

A/Q $P(B) = 3 \times P(R)$

$\frac{x}{x+5} = 3 \times \frac{5}{x+5}$

$\boxed{x = 15}$

$\boxed{\text{no. of blue balls} = 15}$ Ans.