KSEEB Class 10 Maths Question Paper Solution 2017

QUESTION PAPER CODE 81-E

SECTION - I

1. If U = {1, 2, 3, 4, 5, 6, 7, 8}, A = {1, 2, 3} and B = {2, 3, 4, 5}, then (A ∪ B)' is
(A) {5, 6, 7}
(B) {6, 7, 8}
(C) {3, 4, 5}
(D) {1, 2, 3}

Solution:
Correct answer: (B)

Given,
U = {1, 2, 3, 4, 5, 6, 7, 8}
A = {1, 2, 3}
B = {2, 3, 4, 5}
A ∪ B = {1, 2, 3} ∪ {2, 3, 4, 5}
= {1, 2, 3, 4, 5}
(A ∪ B)' = U - (A ∪ B)
= {1, 2, 3, 4, 5, 6, 7, 8} - {1, 2, 3, 4, 5}
= {6, 7, 8}

2. LCM of 18 and 45 is
(A) 9
(B) 45
(C) 90
(D) 81

Solution:
Correct answer: (C)

Prime factorization of 18:
$18 = 2 \times 3 \times 3$
Prime factorization of 45:
$45 = 3 \times 3 \times 5$
LCM(18, 45) = $2 \times 3 \times 3 \times 5 = 90$

3. The mean (x bar) and the standard deviation (σ) of certain scores are 60 and 3 respectively. Then the coefficient of variation is
(A) 5
(B) 6
(C) 7
(D) 8

Solution:
Correct answer: (A)

Given,
Mean = 60
Standard deviation = 3
Coefficient of variation = (standard deviation/mean) × 100
= (3/60) × 100
= 5

4. Rationalising factor of √x - y is
(A) x - y
(B) √x
(C) √x + y
(D) √x - y

Solution:
Correct answer: (D)

Rationalising factor of √x - y is √x - y.
Since (√x - y)(√x - y)
= $[\sqrt{(x - y)}]^2$
= x - y

5. If $f(x) = x^2 - 2x + 15$ then f (– 1) is
(A) 14
(B) 18
(C) 15
(D) 13

Solution:
Correct answer: (B)

Given,
$f(x) = x^2 - 2x + 15$
$f(-1) = (-1)^2 - 2(-1) + 15$
= 1 + 2 + 15
= 18

6. In a circle, the angle subtended by a chord in the major segment is
(A) a straight angle
(B) a right angle
(C) an acute angle
(D) an obtuse angle

Solution:
Correct answer: (C)

In a circle, the angle subtended by a chord in the major segment is an acute angle.

7. The length of the diagonal of a square of side 12 cm is
(A) $5\sqrt{2}$ cm
(B) 144 cm
(C) 24 cm
(D) $12\sqrt{2}$ cm

Solution:
Correct answer: (D)

Given,
Side of a square = a = 12 cm
Diagonal of square = $a\sqrt{2} = 12\sqrt{2}$ cm

8. The distance between the origin and the point (-12, 5) is
(A) 13 units
(B) -12 units
(C) 10 units
(D) 5 units

Solution:
Correct answer: (A)

The distance of a point (x, y) from the origin is $\sqrt{(x^2 + y^2)}$.
The distance between the origin and the point (-12, 5) = $\sqrt{[(-12)^2 + 5^2]}$
= $\sqrt{(144 + 25)}$
= $\sqrt{169}$
= 13 units

SECTION - II

9. Write the value of ${}^{100}P_0$.

Solution:
We know that,
${}^{n}P_0 = 1$
Therefore, ${}^{100}P_0 = 1$
(or)
${}^{100}P_0 = 100!/(100 - 0)!$
= 100!/100!
= 1

10. What is the probability of a certain event?

Solution:
Probability of a certain event or sure event is 1.

11. Find the midpoint of the class-interval 5 – 15.

Solution:
Given,

Class interval is 5 - 15.
Upper limit = 15
Lower limit = 5
Midpoint of the class interval = (lower limit + upper limit)/2
= (5 + 15)/2
= 20/2
= 10

12. Find the value of cos 48° - sin 42°.

Solution:
$\cos 48° - \sin 42°$
$= \cos(90° - 42°) - \sin 42°$
$= \sin 42° - \sin 42°$
$= 0$
(or)
$\cos 48° - \sin 42°$
$= \cos 48° - \sin(90° - 48°)$
$= \cos 48° - \sin 48°$
$= 0$

13. Write the slope and y-intercept of the line y = 3x.

Solution:
Given,
Equation of line is $y = 3x$
Comparing with $y = mx + c$
Here,
Slope = m = 3
y-intercept = c = 0

14. Write the formula used to find the total surface area of a solid hemisphere.

Solution:
Total surface area of a solid hemi-sphere = $3\pi r^2$ sq.units
Here,
r = Radius of the solid hemisphere

SECTION - III

15. If A and B are the sets such that n(A) = 37, n(B) = 26 and n(A ∪ B) = 51, then find n(A ∩ B).

Solution:
Given,
n(A) = 37
n(B) = 26
n(A ∪ B) = 51
We know that,
n(A ∪ B) = n(A) + n(B) - n(A ∩ B)
51 = 37 + 26 - n(A ∩ B)

n(A ∩ B) = 63 - 51
n(A ∩ B) = 12

16. Write the formula used to find
a) arithmetic mean between a and b (a > b)
b) harmonic mean between a and b (a > b).

Solution:
a) Arithmetic mean A.M. = (a + b)/2 (where a > b)
b) Harmonic mean H.M. = 2ab/(a + b) (where a > b)

17. Find the sum to infinity of the geometric series 2 + (2/3) + (2/9) +...

Solution:
Given,
2 + (2/3) + (2/9) +...
Here,
a = 2
r = 2/(3/2) = 1/3
S_∞ = a/(1 - r)
= 2/[1 - (1/3)]
= 2/ [(3 - 1)/3]
= 2/(2/3)
= 3
Therefore, the sum to infinity of the given geometric series is 3.

18. Prove that 3 + √5 is an irrational number.

Solution:
Let 3 + √5 be a rational number.
Thus, 3 + √5 = p/q, where p, q are coprime integers and q ≠ 0.
⇒ √5 = (p/q) - 3
⇒ √5 = (p - 3q)/q
Since p and q are integers, (p - 3q)/q is a rational number.
⇒ √5 is also a rational number.
This is the contradiction to the fact that √5 is an irrational number.
Hence, our assumption that 3 + √5 is a rational number is wrong.
Therefore, 3 + √5 is an irrational number.
Hence proved.

19. Find how many triangles can be drawn through 8 points on a circle.

Solution:
We know that a triangle is formed by joining 3 non-collinear points.
∴ Total number of triangles that can be drawn out of 8 non-collinear points = ${}^{8}C_{3}$
${}^{n}C_{r}$ = n!/(n - r)!r!
Here, n = 8 and r = 3
${}^{8}C_{3}$ = 8!/(8 - 3)!3!
= (8 × 7 × 6 × 5!)/5! (3 × 2)

$= (8 \times 7 \times 6)/6$
$= 56$
Hence, the required number of triangles is 56.

20. If (1/8!) + (1/9!) = x/10!, then find the value of x.

Solution:
$(1/8!) + (1/9!) = x/10!$
$(1/8!) + (1/9 \times 8!) = x/(10 \times 9 \times 8!)$
$(1/8!) [1 + (1/9)] = x/(10 \times 9 \times 8!)$
$(9 + 1)/9 = x/90$
$10/9 = x/90$
$\Rightarrow x = 900/9$
$\Rightarrow x = 100$

21. A box has 4 red and 3 black marbles. Four marbles are picked up randomly. Find the probability that two marbles are red.

Solution:
Given,
A box has 4 red and 3 black marbles.
Out of 7 marbles, 4 marbles can be drawn in ${}^7C_4 = 35$ ways
Thus, n(S) = 35
Two red marbles can be drawn in ${}^4C_2 = 6$ ways
The remaining 2 marbles must be black and they can be drawn
in ${}^3C_2 = 3$ ways
$n(A) = 6 \times 3 = 18$
$P(A) = n(A)/n(S)$
$= 18/35$

22. Calculate standard deviation for the following scores:
5, 6, 7, 8, 9.

Solution:
Using direct method:

x	$\mathbf{x^2}$
5	25
6	36
7	49
8	64
9	81
$\sum x = 35$	$\sum x^2 = 255$

N = 5

Standard deviation

$$\sigma = \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2}$$

$$= \sqrt{\frac{255}{5} - \left(\frac{35}{5}\right)^2}$$

$$= \sqrt{51 - 49}$$

$$= \sqrt{2}$$

$\sigma = 1.414$

23. Solve $x^2 - 2x - 4 = 0$ by using formula.

Solution:

Given quadratic equation is:

$x^2 - 2x - 4 = 0$

Comparing with the standard form $ax^2 + bx + c = 0$,

a = 1, b = -2, c = -4

Using the quadratic formula,

$x = [-b \pm \sqrt{(b^2 - 4ac)}]/2a$

$x = [-(-2) \pm \sqrt{\{(-2)^2 - 4(1)(-4)\}}]/ 2(1)$

$= [2 \pm \sqrt{(4 + 16)}]/2$

$= (2 \pm 2\sqrt{5})/2$

$= 2(1 \pm \sqrt{5})/2$

$= 1 \pm \sqrt{5}$

Hence, the roots of the given equation are $(1 + \sqrt{5})$ and $(1 - \sqrt{5})$.

OR

Determine the nature of the roots of the equation $x^2 - 2x - 3 = 0$.

Solution:

Given quadratic equation is:

$x^2 - 2x - 3 = 0$

Comparing with the standard form $ax^2 + bx + c = 0$,

a = 1, b = -2, c = -3

$\Delta = b^2 - 4ac$

$= (-2)^2 - 4(1)(-3)$

$= 4 + 12$

$= 16$

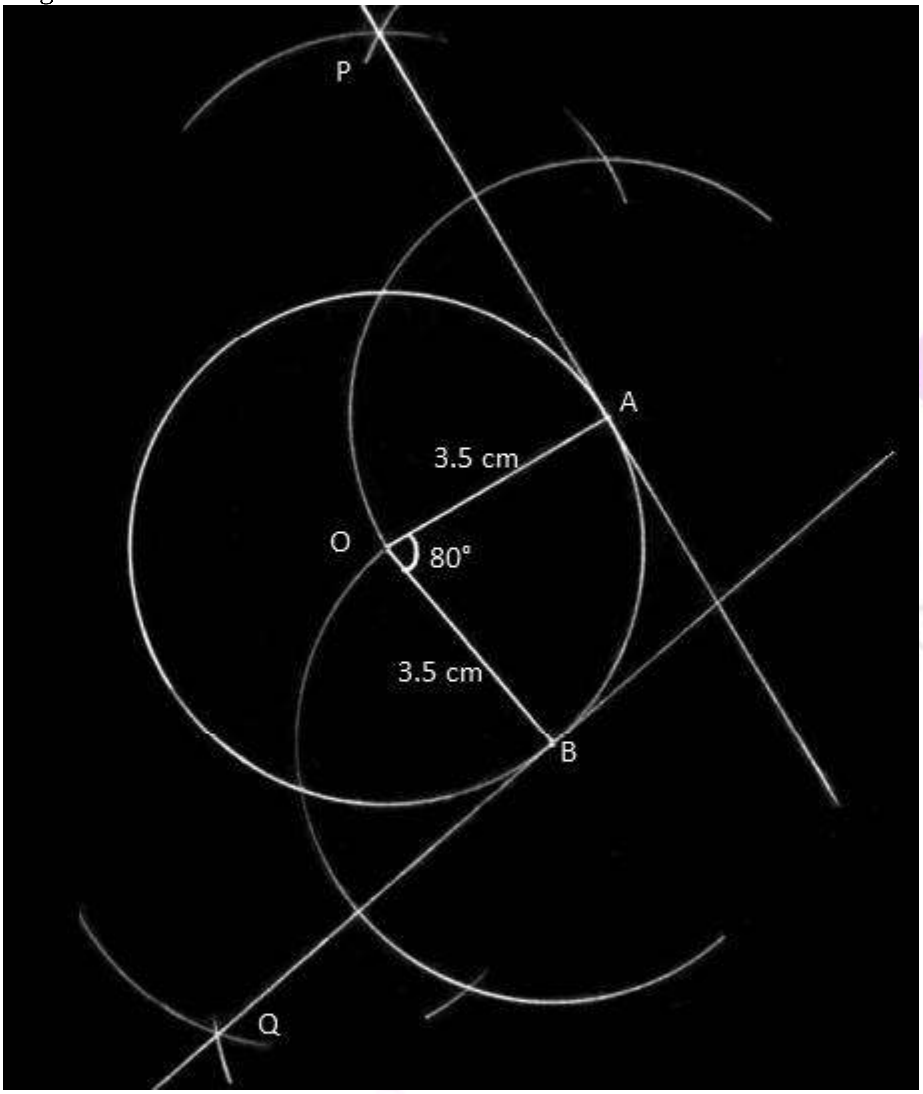
$\Delta > 0$

Discriminant is greater than 0.

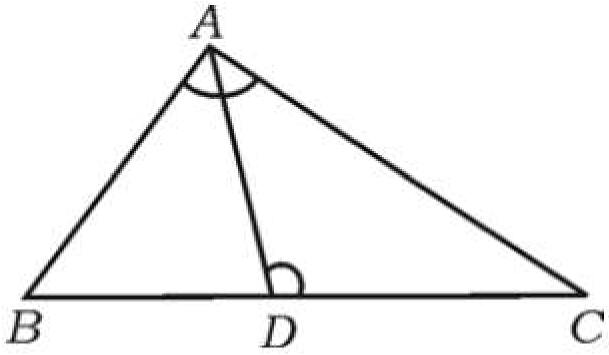
Therefore, the roots of the equation are real and distinct.

24. In a circle of radius 3·5 cm, draw two radii such that the angle between them is 80°. Construct tangents to the circle at the non-centre ends of the radii.

Solution:
Given,
Radius = 3.5 cm
Angle between two radii = 80°



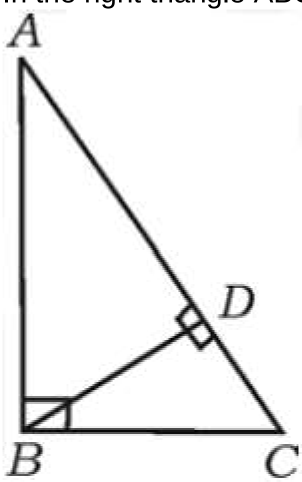
25. In ΔABC, D is a point on BC such that ∠BAC = ∠ADC. Prove that $AC^2 = BC \times DC$.



Solution:
In ΔABC and ΔADC,
∠BAC = ∠ADC (given)
∠ACB = ∠ACD (common)
By AA similarity criterion,
ΔACB ~ ΔDCA
⇒ AC/DC = CB/CA
⇒ $AC^2 = BC \times DC$
Hence proved.

OR

In the right triangle ABC, ∠ABC = 90° and BD ⊥ AC. Prove that: $AB^2/BC^2 = AD/CD$



Solution:
Given that, in right triangle ABC, ∠ABC = 90° and BD ⊥ AC.
By the corollary of right angle theorem,
$AB^2 = AD \times AC$ ....(i)
And
$BC^2 = CD \times AC$ ....(ii)
Dividing (i) by (ii),
$AB^2/BC^2 = (AD \times AC)/ (CD \times AC)$
$AB^2/BC^2 = AD/CD$
Hence proved.

26. Find the value of sin 30° . cos 60° - $\tan^2 45°$.

Solution:
sin 30° = 1/2
cos 60° = 1/2
tan 45° = 1
sin 30° . cos 60° - $\tan^2 45°$
$= (1/2) \times (1/2) - (1)^2$
= (1/4) - 1
= (1 - 4)/4
= -3/4

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27. Find the radius of a circle whose centre is (-5, 4) and which passes through the point (-7, 1).

Solution:
Given,
Centre = C(-5, 4)
Circle passes through the point A = (-7, 1)
Radius of the circle = Distance between A and C
Let, $(x_1, y_1) = (-5, 4)$
$(x_2, y_2) = (-7, 1)$

$$AC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{[-7 - (-5)]^2 + (1 - 4)^2}$$
$$= \sqrt{(-7 + 5)^2 + (-3)^2}$$
$$= \sqrt{(-2)^2 + (-3)^2}$$
$$= \sqrt{4 + 9}$$
$$= \sqrt{13}$$

Therefore, the radius of the circle is √13 units.

28. The radii of two right circular cylinders are in the ratio 2 : 3 and the ratio of their curved surface areas is 5 : 6. Find the ratio of their heights.

Solution:
Let h_1 and h_2 be the heights of two right circular cylinders.
Given,
Ratio of the radii of two right circular cylinders = $r_1 : r_2 = 2 : 3$
Ratio of the curved surface areas = $S_1 : S_2 = 5 : 6$
$2\pi r_1 h_1/2\pi r_2 h_2 = 5/6$
$2h_1/3h_2 = 5/6$
$h_1/h_2 = (5 \times 3)/(6 \times 2)$
$h_1/h_2 = 5/4$
Hence, the required ratio is 5 : 4.

29. The radius of a solid metallic sphere is 10 cm. It is melted and recast into small cones of height 10 cm and base radius 5 cm. Find the number of small cones formed.

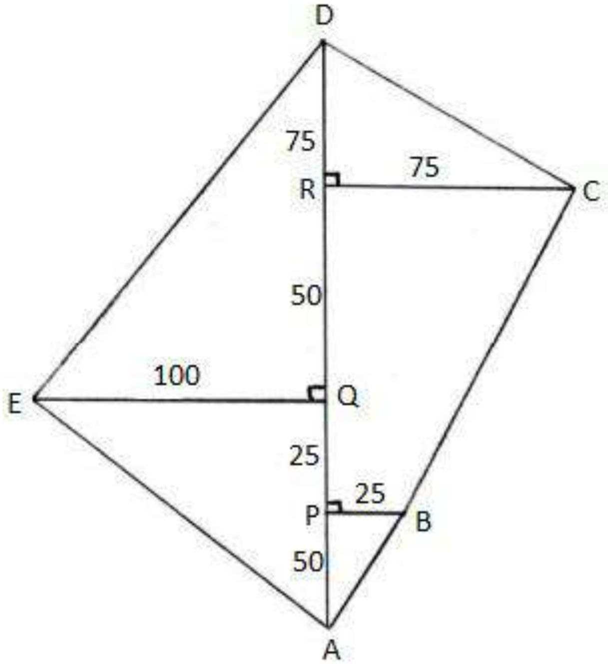
Solution:
Given,
Radius of solid sphere = R = 10 cm
Base radius of cone = r = 5 cm
Height of cone = h = 10 cm
Number of small cones = Volume of sphere/Volume of one small cone
$= (4/3)\pi R^3/ [(1/3)\pi r^2 h]$
$= (4 \times 10 \times 10 \times 10)/ (5 \times 5 \times 10)$

= 4 × 2 × 2
= 16
Hence, the number of small cones formed from the sphere = 16

30. Draw a plan by using the information given below:
[Scale: 25 metres = 1 cm]

	Metre To D	
	200	
	125	75 to C
100 to E	75	
	50	25 to B
	From A	

Solution:
Scale:
25 m = 1 cm
50 m = 2 cm
75 m = 3 cm
100 m = 4 cm
125 m = 5 cm
200 m = 8 cm



SECTION - IV

31. Rationalise the denominator and simplify:
(√6 + √3)/(√6 - √3)

Solution:
(√6 + √3)/(√6 - √3)
By rationalising the denominator,
= [(√6 + √3)/(√6 - √3)] × [(√6 + √3)/(√6 + √3)]
= $(\sqrt{6} + \sqrt{3})^2$/ $[(\sqrt{6})^2 - (\sqrt{3})^2]$
= (6 + 3 + 2√6√3)/ (6 - 3)
= (9 + 2√18)/3
= (9 + 6√2)/3
= 3(3 + 2√2)/3
= 3 + 2√2

32. Find the quotient q(x) and remainder r(x) on dividing $p(x) = x^3 + 4x^2 - 5x + 6$ by g(x) = x + 1 and hence verify p(x) = [g(x) × q(x)] + r(x).

Solution:
Given,
$p(x) = x^3 + 4x^2 - 5x$
g(x) = x + 1

$$\begin{array}{r|llll}
 & x^2 & +3x & -8 & \\ \hline
x+1 & x^3 & +4x^2 & -5x & +6 \\
 & - & & & \\
 & x^3 & +x^2 & & \\ \hline
 & & 3x^2 & -5x & +6 \\
 & & - & & \\
 & & 3x^2 & +3x & \\ \hline
 & & & -8x & +6 \\
 & & & - & \\
 & & & -8x & -8 \\ \hline
 & & & & 14
\end{array}$$

Quotient = q(x) = $x^2 + 3x - 8$
Remainder = r(x) = 14
Verification:
[g(x) × q(x)] + r(x)
= $(x + 1)(x^2 + 3x - 8) + 14$
= $x^3 + 3x^2 - 8x + x^2 + 3x - 8 + 14$
= $x^3 + 4x^2 - 5x + 6$
= p(x)
Therefore, p(x) = [g(x) × q(x)] + r(x)

OR

Find the quotient and remainder by using synthetic division:
$(4x^3 - 16x^2 - 9x - 36) \div (x + 2)$

Solution:
$(4x^3 - 16x^2 - 9x - 36) \div (x + 2)$
Using synthetic division,

$$\begin{array}{r|rrrr}
-2 & 4 & -16 & -9 & -36 \\
 & & -8 & 48 & (-2)\cdot 39 = -78 \\ \hline
 & 4 & -24 & 39 & (-36)+(-78) = -114
\end{array}$$

Therefore,
Quotient = q(x) = $4x^2 - 24x + 39$
Remainder = r(x) = -114

33. Find three consecutive positive integers such that the sum of the square of the first integer and the product of the other two is 92.

Solution:
Let x, (x + 1) and (x + 2) be the three consecutive positive integers.
According to the given,
$x^2 + (x + 1)(x + 2) = 92$
$x^2 + x^2 + 2x + x + 2 = 92$
$2x^2 + 3x + 2 - 92 = 0$
$2x^2 + 3x - 90 = 0$
$2x^2 - 12x + 15x - 90 = 0$
$2x(x - 6) + 15(x - 6) = 0$
$(x - 6)(2x + 15) = 0$
$x - 6 = 0, 2x + 15 = 0$
$x = 6, x = -15/2$
x cannot be negative.
Therefore, x = 6
Hence, the required three consecutive positive integers are 6, 7 and 8.

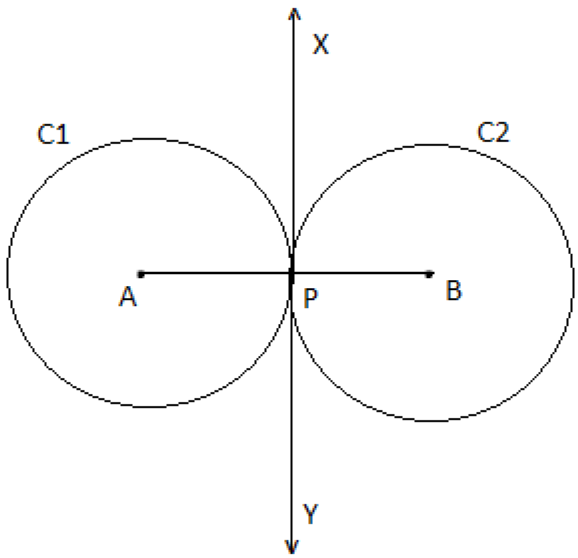
OR

Sum of the squares of any two numbers is 180. If the square of the smaller number is equal to 8 times the bigger number, find the two numbers.

Solution:
Let x, y be the two numbers and x > y.
Sum of the squares of two numbers is 180.
i.e. $x^2 + y^2 = 180$ ....(i)
Given that the square of the smaller number is equal to 8 times the bigger number.
i.e. $y^2 = 8x$ ....(ii)
From (i) and (ii),
$x^2 + 8x = 180$
$x^2 + 8x - 180 = 0$
$x^2 + 18x - 10x - 180 = 0$
$x(x + 18) - 10(x + 18) = 0$
$(x + 18)(x - 10) = 0$
$x = -18, x = 10$
x = -18 is not possible.
Thus, x = 10
Substituting x = 10 in (ii),
$y^2 = 8 \times 10$
$= 80$
$y = \sqrt{80} = 4\sqrt{5}$
Hence, the required numbers are 10 and $4\sqrt{5}$.

34. Prove that "If two circles touch each other externally, the centres and the point of contact are collinear".

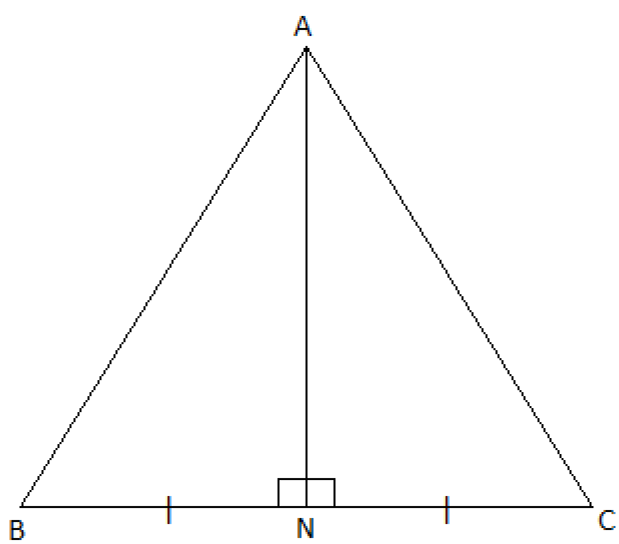
Solution:
Let A be the centre of circle C1 and B be the centre of circle C2.
P be the point of contact.
Draw tangent XY which passes through P.



$\angle APX = \angle BPX = 90°$ (radius is perpendicular to the tangent through the point of contact)
Now,
$\angle APX + \angle BPX = 90° + 90° = 180°$
180° is the angle formed by a straight line.
Thus, $\angle APX$ and $\angle BPX$ is a linear pair.
Therefore, A, P and B are collinear.
Hence proved.

35. In an equilateral triangle ABC, $AN \perp BC$, prove that $4AN^2 = 3AB^2$.

Solution:
Given that in an equilateral triangle ABC, $AN \perp BC$.



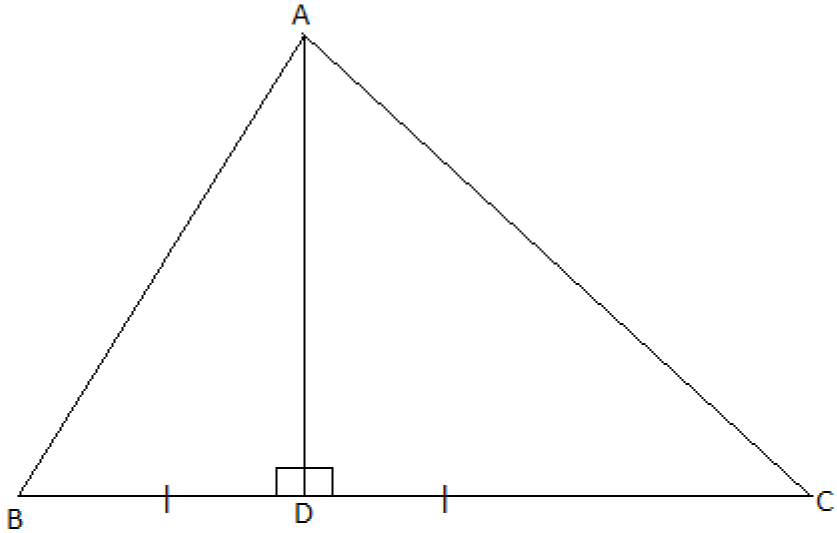
Thus, BN = NC = (1/2)BC = (1/2)AB
In right triangle ANB,
$AB^2 = AN^2 + BN^2$

$AN^2 = AB^2 - BN^2$
$= AB^2 - [(1/2)AB]^2$
$= AB^2 - (AB^2/4)$
$= (4AB^2 - AB^2)/4$
$4AN^2 = 3AB^2$
Hence proved.

OR

In ΔABC, AD ⊥ BC, prove that $AB^2 + CD^2 = AC^2 + BD^2$.

Solution:
Given that in ΔABC, AD ⊥ BC.



In right triangle ADB,
$AB^2 = AD^2 + BD^2$
$\Rightarrow AD^2 = AB^2 - BD^2$ ....(i)
In right triangle ADC,
$AC^2 = AD^2 + DC^2$
$\Rightarrow AD^2 = AC^2 - DC^2$ ....(ii)
From (i) and (ii),
$AB^2 - BD^2 = AC^2 - DC^2$
$AB^2 + DC^2 = AC^2 + BD^2$
Hence proved.

36. Prove that $\tan^2A - \sin^2A = \tan^2A \cdot \sin^2A$.

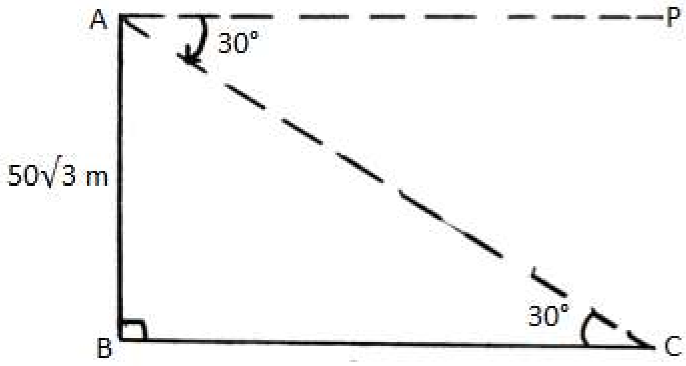
Solution:
LHS = $\tan^2A - \sin^2A$
$= (\sin^2A/\cos^2A) - \sin^2A$
$= (\sin^2A - \sin^2A \cos^2A)/\cos^2A$
$= \sin^2A(1 - \cos^2A)/\cos^2A$
Using the identity $\sin^2\theta + \cos^2\theta = 1$,
$= (\sin^2A \sin^2A)/\cos^2A$
$= (\sin^2A/\cos^2A) \sin^2A$

$= \tan^2 A \sin^2 A$
= RHS
Hence proved.

OR

From the top of a building 50√3 m high the angle of depression of an object on the ground is observed to be 30°. Find the distance of the object from the foot of the building.

Solution:
Let AB be the building and C be the object.



AB = 50√3 m
∠PAC = ∠ACB = 30°
Angle of depression = θ = 30°
In right triangle ABC,
tan 30° = AB/BC
1/√3 = (50√3)/BC
BC = (50√3) × √3
= 50 × 3
= 150
Hence, the distance between the building and the objec = BC = 150 m

SECTION - V

37. The sum of 3rd and 5th terms of an arithmetic progression is 30 and the sum of 4th and 8th terms of it is 46. Find the arithmetic progression.

Solution:
Let a be the first term and d be the common difference of an AP.
According to the given,
$a_3 + a_5 = 30$
a + 2d + a + 4d = 30
2a + 6d = 30
2(a + 3d) = 30
a + 3d = 15 ....(i)
And
$a_4 + a_8 = 46$
a + 3d + a + 7d = 46
2a + 10d = 46

$2(a + 5d) = 46$
$a + 5d = 23$ ....(ii)
Subtracting (i) from (ii),
$a + 5d - (a + 3d) = 23 - 15$
$2d = 8$
$d = 8/2 = 4$
Substituting $d = 4$ in (i),
$a + 3(4) = 15$
$a + 12 = 15$
$a = 15 - 12$
$a = 3$
$a + d = 3 + 4 = 7$
$a + 2d = 3 + 2(4) = 11$
$a + 3d = 3 + 3(4) = 15$
Hence, the required AP is 3, 7, 11, 15,...

OR

If the fourth term of a geometric progression is 8 and its eighth term is 128, find the sum of the first ten terms of the progression.

Solution:
Given that in GP,
$a_4 = 8$
$ar^3 = 8$ ....(i)
And
$a_8 = 128$
$ar^7 = 128$ ....(ii)
Dividing (ii) by (i),
$ar^7/ar^3 = 128/8$
$r^4 = 16$
$r^4 = (2)^4$
$r = 2$
Substituting $r = 2$ in (i),
$a(2)^3 = 8$
$8a = 8$
$a = 8/8 = 1$
Sum of the first n term
$S_n = a(r^n - 1)/(r - 1)$
$S_{10} = 1(2^{10} - 1)/(2 - 1)$
$= 1024 - 1$
$= 1023$
Hence, the sum of the first 10 terms of the GP is 1023.
38. Solve $x^2 - 2x - 3 = 0$ graphically.

Solution:
Given,
$x^2 - 2x - 3 = 0$
$x^2 - (2x + 3) = 0$
Thus, the solution will be the intersection of $y = x^2$ and $y = 2x + 3$

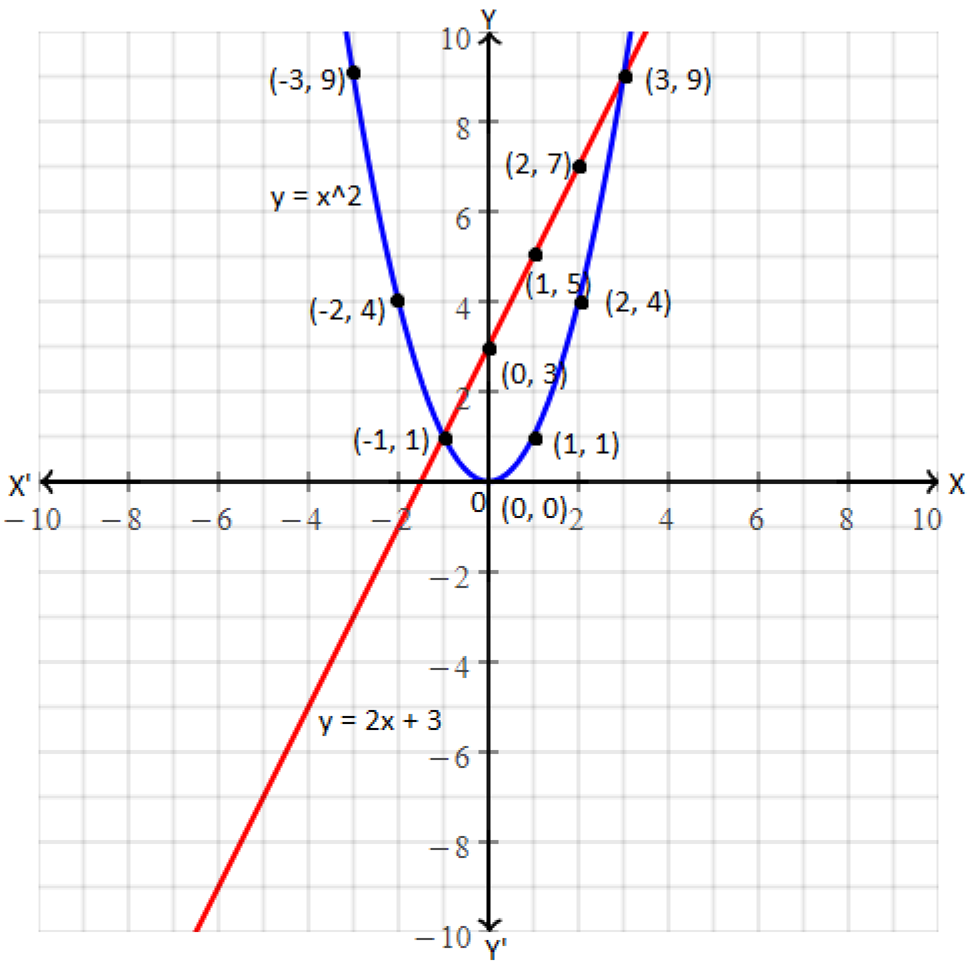
Consider, $y = x^2$

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

$y = 2x + 3$

x	-1	0	1	2	3
y	1	3	5	7	9

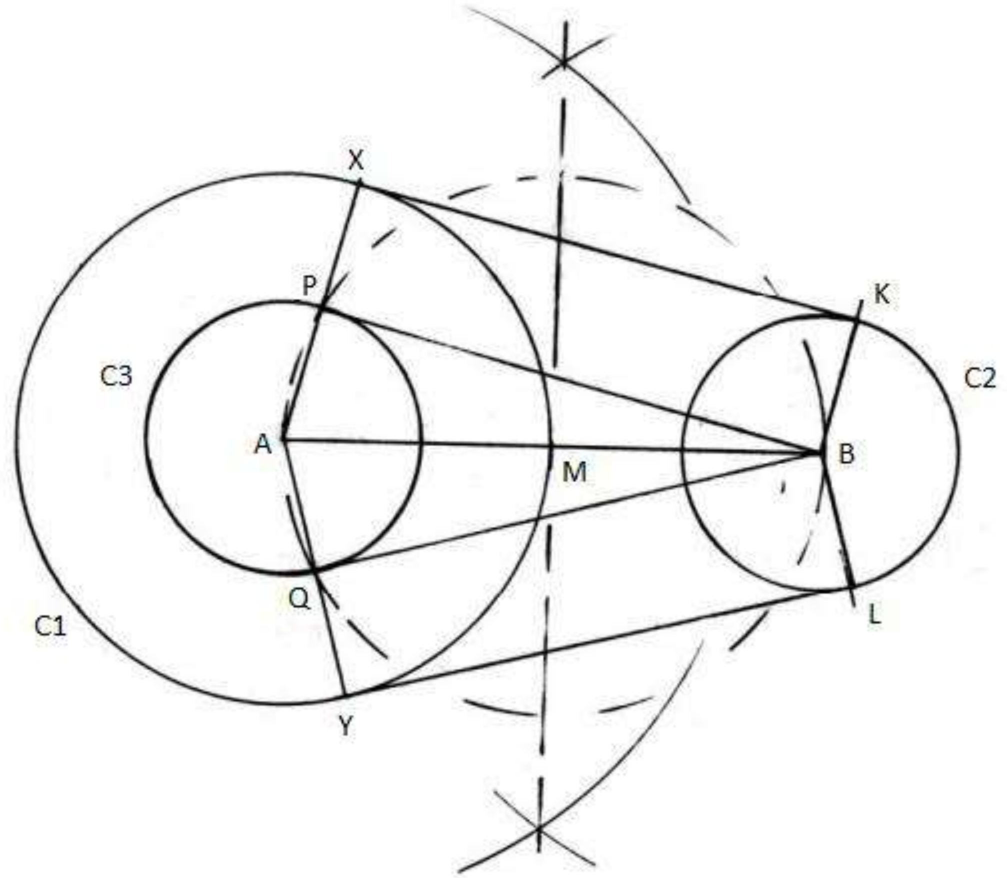
Graph:



These intersect each other at x = -1 and x = 3.
Hence, the required solution is x = -1 and x = 3

39. Construct a pair of direct common tangents to two circles of radii 4 cm and 2 cm whose centres are 8 cm apart. Measure and write the length of the direct common tangent.

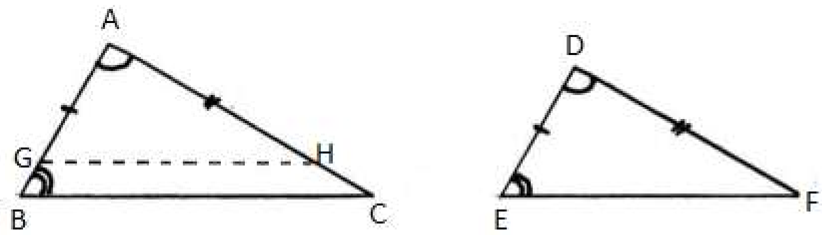
Solution:



Therefore, KX and LY are the required tangents of length 7.8 cm.

40. Prove that "If two triangles are equiangular, then their corresponding sides are in proportion".

Solution:
Given,
In ΔABC and ΔDEF,
∠BAC = ∠EDF
∠ABC = ∠DEF
To prove: AB/DE = BC/EF = AC/DF
Construction:
Points G and H are marked on AB and AC such that AG = DE and AH = DF. Join GH.



In ΔAGH and ΔDEF,
AG = DE (by construction)
$\angle$GAH = $\angle$EDF (given)
AH = DF (by construction)
BY SAS congruence criterion,
$\Delta AGH \cong \Delta DEF$
Thus, by CPCT,
GH = EF
$\angle$AGH = $\angle$DEF
Given that, $\angle$DEF = $\angle$ABC
$\angle$AGH = $\angle$ABC (alternate angles)
Therefore, GH || BC
By the corollary of Thales(BPT) theorem,
AB.AG = BC/GH = AC/AH
And, AG = DE , GH = EF, AH = DF
Therefore,
AB/DE = BC/EF = AC/DF
Hence proved.