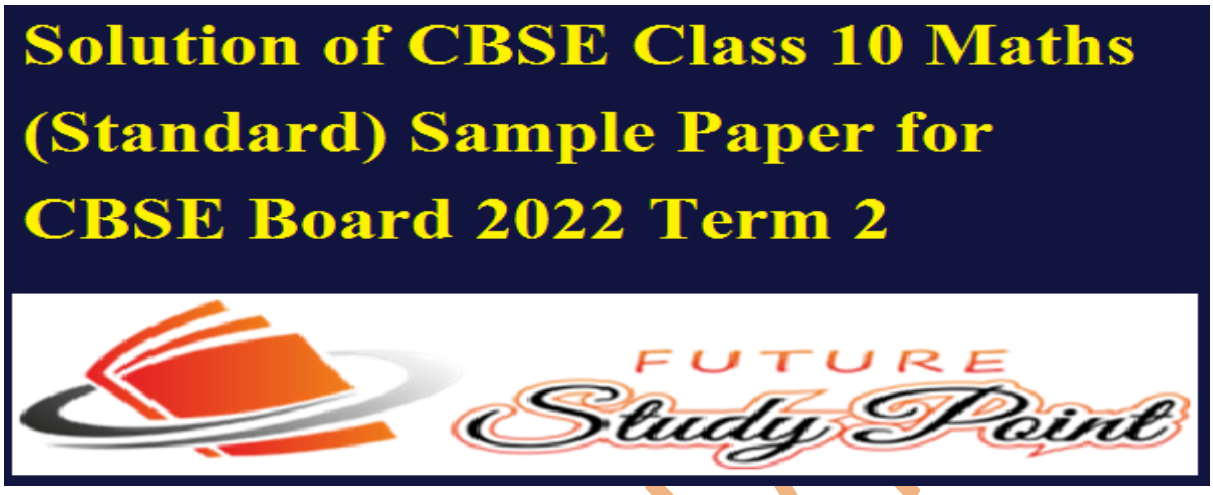
Solution of CBSE Class 10 Maths(Standard) Sample Paper for CBSE Board 2022 Term 2



Solution of CBSE Class 10 Maths(Standard) Sample Paper for CBSE Board 2022 Term 2 published by CBSE is created by an experienced maths expert for the help of CBSE class 10 in boosting their preparation of CBSE Board exam term 2. Total questions in the class 10 sample paper are 14, which are divided into three sections A,B and C. In section A there are 6 questions each of 2 marks, Section B comprises of 4 questions each of 3 marks and section C comprises of 4 questions each of 4 marks. Section A has two questions in which internal choice is provided, Section B and Section C both have been provided with an internal choice of one question each.

Class 10 Science Notes for Term 2

Solution of CBSE Class 10 Maths(Standard) Sample Paper for CBSE Board 2022 Term 2

Q1.Find the value of a_{25}-a_{15} for the AP: 6, 9, 12, 15, ……..

OR

If 7 times the seventh term of the AP is equal to 5 times the fifth term, then find the value of its 12^{th} term.

Ans.The given AP is 6, 9, 12, 15, ……..

n^{th} term of the AP is given by

$a_n = a +(n -1)d$

Where a =6,d = 9 -6 =3

a_{25} = 6+(25 -1)×3 =6+24×3 =6 +72=78

a_{15} = 6+(15 -1)×3 =6+14×3 =6 +42=48

a_{25} - a_{15} = 78 - 48 =30

OR

7×Seventh term of an AP = 5×Fifth term of the same AP

7[a +(7-1)d] = 5[a +(5-1)d]

7a + 7×6d =5a + 5×4d

7a + 42d =5a + 20d

7a - 5a = 20d -42d = -22d

2a = -22d

a = -11d

12^{th} term of the AP is

a_{12} = -11d +(12 -1)d =-11d +11d =0

Q2.Find the value of m so that the quadratic equation mx(5x− 6) = 0 has two equal roots.

Ans. The quadratic equation $ax^2 + bx + c = 0$ has equal roots when

$D = b^2 - 4ac = 0$

The given quadratic equation

mx(5x− 6) = 0

$5mx^2 - 6mx = 0$

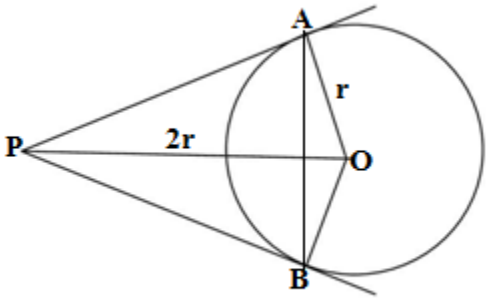
b = -6m, a =5m and c =0

$(-6m)^2 - 4 \times 5m \times 0 = 0$

$36m^2 = 0$

m =0

Q3.From a point P, two tangents PA and PB are drawn to a circle C(0, r). If OP = 2r, then find ∠APB. What type of triangle is ΔAPB?



Ans.The line segment joining an external point to the centre of the circle bisect the angle between the tangents drawn from the same external point

∠APB=2∠APO

∠OAP =90° (the angle between the radius and the tangent)

Therefore ΔOAP is a right triangle where

OP=2r is the hypotenuse and OA =r is the perpendicular for the ∠APB under consideration

Let the ∠APB =θ°

sin θ° =p/h =r/2r =1/2

Since sin 30° =1/2

sin θ° = sin 30°

θ° = 30°

∠APB = 2θ° =2×30° =60°

Since the tangents drawn from an external point to the circle are equal

AP = PB moreover ∠APB =60°
∠APB +∠PAB +∠PBA =180°

60° + 2∠PAB = 180°[∠PAB =∠PBA]

2∠PAB = 180°-60°

∠PAB =120°/2 =60°

Therefore ΔAPB is an equilatral triangle

Q4.The curved surface area of a right circular cone is 12320 cm². If the radius of its base is 56cm, then find its height.

Ans. The given curved surface area of a right circular cone is 12320 cm²

Curved surface area of a right circular cone =πrl

where r =56 cm is given radius of the base and h is the height

Therefore

πrl= 12320

(22/7) ×56×l = 12320

l = (12320 ×7)(22×56) =12320/(22×8) =12320/176=70

Slant height,l =70 cm

Therefore height ,h=√(l² -r²) =√(70² -56²) =√(4900-3136) =√1764 =42 cm

Q5.Mrs. Garg recorded the marks obtained by her students in the following table. She calculated the modal marks of the students of the class as 45. While printing the data, a blank was left. Find the missing frequency in the table given below.

Marks obtained	0 - 20	20 - 40	40 - 60	60 -80	80 -100
Number of Students	5	10	.....	6	3

Ans.Let the missing frequency of the student is F

Marks obtained(x)	Number of Students(f)
0 - 20	5
20 - 40	**10(f_0)**
40 - 60	**F(f_1)**
60 - 80	**6(f_2)**
80 - 100	3

Since the mode of the data given to us is 45 which lies between (40 -60),therefore modal class is 40 - 60.

$$M = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

Where M =45,frequency preceded by the modal frequency(f_0)=10

Modal frequency (f_1) =F, frequency succeeded by the modal frequency(f_2)=6,lower limit of the modal class,l=40

$$45 = 40 + \frac{F - 10}{2F - 10 - 6} \times 20$$

$$\frac{20F - 200}{2F - 16} = 45 - 40 = 5$$

20 F -200 =10F - 80

20F -10F = -80 +200 =120

10F =120

F = 120/10 =12

Hence the missing frequency in the table is 12

Q6.If Ritu were younger by 5 years than what she really is, then the square of her age would have been 11 more than five times her present age. What is her present age?

OR

Solve for x: $9x^2 - 6px + (p^2 - q^2) = 0$

Ans. Let the present age of Ritu is x

If Ritu is 5 years younger than his present age then his age is =x -5

5 times of his present age = 5x

According to the condition that **t**he square of her age would have been 11 more than five times her present age

$(x-5)^2 = 5x+11$

$x^2-10x +25 = 5x +11$

$x^2 -10x -5x +25 -11 =0$

$x^2 -15x +14 =0$

$x^2 -14x-x +14 =0$

$x(x -14) -1(x -14) =0$

$(x -14) (x -1) =0$

$x =14,1$

x =1 is impossible because the age of Ritu can't be negative 5 years back

OR

Solve for x: $9x^2 - 6px + (p^2 - q^2) = 0$

The given equation is

$9x^2 - 6px + (p^2 - q^2) = 0$

Applying the quadratic equation formula for the solution of qudaratic equation $ax^2 +bx +c =0$

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

Where $a = 9$, $b = -6p$, $c = (p^2 - q^2)$

$x = [6p \pm \sqrt{\{36p^2 - 4 \times 9 (p^2 - q^2)\}}]/(2 \times 9)$

$= [6p \pm \sqrt{\{36p^2 - 4 \times 9(p^2 - q^2)\}}]/18$

$= [6p \pm \sqrt{\{36p^2 - 36 (p^2 - q^2)\}}]/18$

$= [6p \pm 6\sqrt{\{p^2 - 1 (p^2 - q^2)\}}]/18$

$= [6(p \pm \sqrt{[p^2 - p^2 + q^2]}/18$

$= (p \pm q)/3$

Hence the value of x is $= (p \pm q)/3$

Q7.Following is the distribution of the long jump competition in which 250 students participated. Find the median distance jumped by the students. Interpret the median

Ans.

Distance in meter	No. of Students	Cumulative frequency
0 -1	40	40
1 - 2	80	**120(cf)**
(l)2 - 3	**62(f)**	182
3 -4	38	220
4 - 5	30	250

N = 250

N /2 =250 /2 =125th term lies in 2 -3 class interval therefore 2-3 is midiuan group

$$m = l + \frac{N/2 - cf}{f} \times h$$

Where l =2, cf =120, f =62,h =3 -2 =1

$$m = 2 + \frac{125 - 120}{62} \times 1$$

$$m = 2 + 0.0806 = 2.0806$$

Hence midiun distance jumped by the students is 2.0806 m

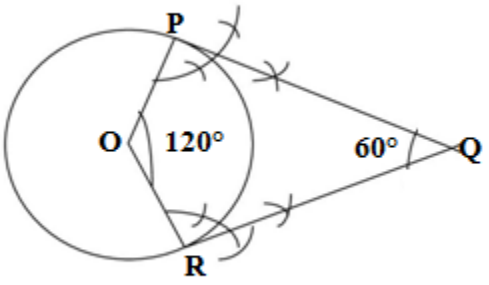
Interpretation of the median-It can be observed that 50 % students jumped over 2.0806 m and 50 % students jumped bellow 2.0806 m

Q8.Construct a pair of tangents to a circle of radius 4cm, which are inclined to each other at an angle of 60°.

Ans. The angle between the tangents drawn from an external point to the circle is 60°

The sum of the angle between the radii and the angle between the tangents is 180°

The angle between the radii is 180°- 60°=120°



Construction: (i) Drawing a circle of the radius 4 cm

(ii) Drawing two radii OP and OR such that the angle between them is 120°

(iii) Drawing 90° angle at P and R such that PQ⊥OP and QR ⊥OR, which join each other at point Q.

(iv) The required tangents are PQ and QR inclined to each other at an angle of 60°

Q9.The distribution given below shows the runs scored by batsmen in one-day cricket matches. Find the mean number of runs.

Runs Scored	0 - 40	40 -80	80 -120	120-160	160-200
No of Batsmen	12	20	35	30	23

Ans.

Runs Scored	No.of Batsmen(f)	Class Mark(x)	d = x - A	fd
0 - 40	12	20	-80	-960
40 - 80	20	60	-40	-800
80 - 120	35	**100(A)**	0	0
120 - 160	30	140	40	1200
160 - 200	23	180	80	1840
	∑f =120			∑fd=1280

Mean = A + ∑fd/∑f

= 100 +1280/120

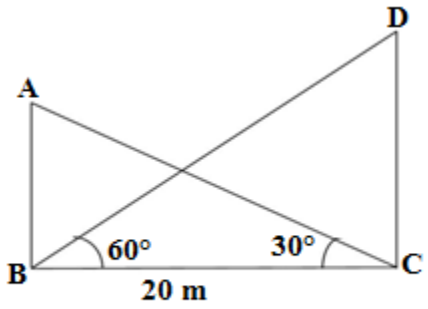
=100 +10.67

=110.67

Hence the mean of the number of runs scored by the batsmen

Q10.Two vertical poles of different heights are standing 20m away from each other on the level ground. The angle of elevation of the top of the first pole from the foot of the second pole is 60° and the angle of elevation of the top of the second pole from the foot of the first pole is 30°. Find the difference between the heights of the two poles. (Take √3 = 1.73)

Ans. Let two poles are AB and DC



tan 60° = DC/BC

√3 = DC/20

DC= 20√3 m

tan 30° = AB/BC

1/√3 = AB/20

AB= 20/√3 m

DC - AB =20√3 -20/√3 =(60 -20)/√3=40/√3

Ratiolazing the denominator

(40√3)/(√3×√3)

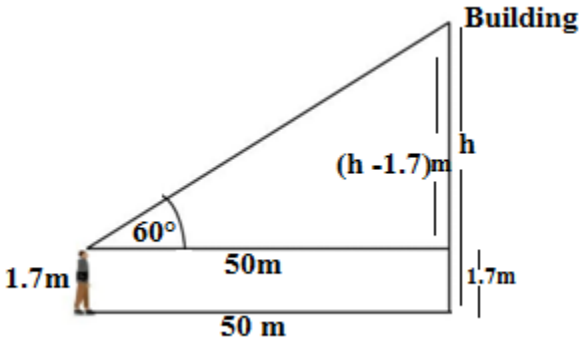
=40√3/3 =(40×1.73)/3 =69.2/2 =23.06 m

The difference between the heights of the two poles is 34.6 m -11.53 m=23.04m

OR

A boy 1.7 m tall is standing on horizontal ground, 50 m away from a building. The angle of elevation of the top of the building from his eye is 60°. Calculate the height of the building. (Take √3 = 1.73)

Ans.Let the height of building is h



tan 60° = (h -1.7)/50

√3 = (h -1.7)/50

50√3 = h -1.7

h = 50√3 +1.7 =50×1.73 +1.7 =86.5+1.7=88.2 m

SECTION C

Q11.The internal and external radii of a spherical shell are 3cm and 5cm respectively. It is melted and recast into a solid cylinder of diameter 14cm, find the height of the cylinder. Also find the total surface area of the cylinder.

(Take π = 22/7)

Ans. The internal radius(r)of the spherical shell is given 3 cm

The outer radius(R)of the spherical shell is given 5 cm

The volume(V) of the spherical shell is

$V= 4\pi/3(R^3 - r^3)$

$=4\pi(5^3 - 3^3)/3$

$=4\pi(125 - 27)/3$

$=4\pi\times98/3$

Since spherical shell is melted and recast into a solid cylinder

∴ Volume of the solid cylinder = Volume of the spherical shell

Diameter of the cylinder is given 14 cm therefore its radius R' =14/2 =7 cm

$\pi R'^2h = 4\pi \times 98/3$, where h is the height of the cylinder

$R'^2h = 4\pi \times 98/3$

$7^2h = 392/3$

$49h = 392/3$

$h = 392/(49 \times 3)$

$h = 8/3$ m

Total srface area of the cylinder

$= 2\pi R'(R' + h)$

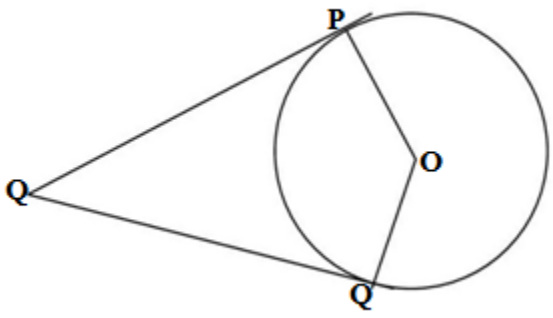
$= 2 \times 22/7 \times 7(7 + 8/3)$

$= 44(29/3)$

$= 1276/3$ m²

Q12.Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact to the centre.

Ans.Let there is a circle with centre O and two tangents PQ and QR are drawn from an external point Q



GIVEN: A circle with centre O and two tangents PQ and QR ,their points of contact to the circle are P and R are respectively

Construction: Joining O to P and O to R

TO PROVE: ∠PQR + ∠POQ =180°

PROOF: OP⊥PQ and OR⊥QR (radius is perpendicular to the tangent)

∴∠QRO = ∠QPO =90°

According to angle sum property of the quadrilateral OPQR

∠PQR + ∠POQ +∠QRO + ∠QPO =360°

∠PQR + ∠POQ +90°+90° =360°

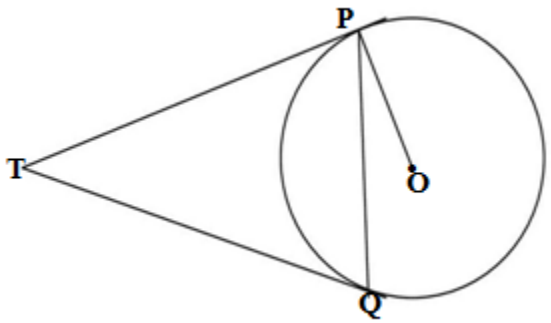
∠PQR + ∠POQ +180°=360°

∠PQR + ∠POQ =360° - 180°

∠PQR + ∠POQ = 180°,Hence proved

OR

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ



GIVEN: Two tangents TP and TQ are drawn to a circle with centre O from an external point T

TO PROVE:∠PTQ = 2∠OPQ

PROOF:OP ⊥PT (radius is perpendicular to the tangent)

∴∠TPO =90°

PT = QT(tangents drawn to circle from an external point are equal)

∴∠TPQ = ∠TQP (opposite angles of equal sides in the Δ PTQ)

Applying angle sum property of the triangle

∠PTQ + ∠TPQ +∠TQP=180°

∠PTQ+ ∠TPQ +∠TPQ=180°

∠PTQ + 2∠TPQ =180°

∠TPQ =90°-∠OPQ

∠PTQ + 2(90°-∠OPQ)=180°

∠PTQ +180° -2∠OPQ = 180°

∠PTQ - 2∠OPQ =0

∠PTQ = 2∠OPQ, Hence proved

CASE STUDY -1

Q13.Trigonometry in the form of triangulation forms the basis of navigation, whether it is by land, sea or air. GPS a radio navigation system helps to locate our position on earth with the help of satellites.

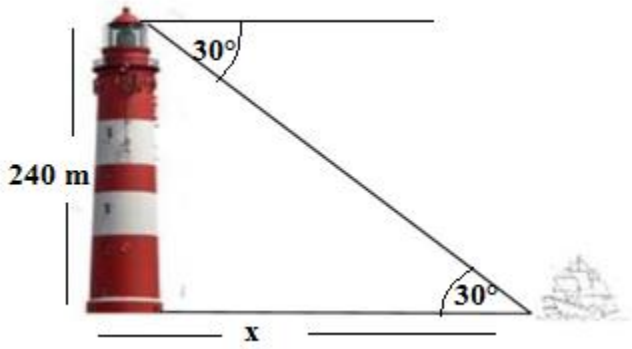
A guard, stationed at the top of a 240m tower, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes(tilt). The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30°.

(Lighthouse of Mumbai Harbour. Picture credits - Times of India Travel)

(i)Make a labelled figure on the basis of the given information and calculate the distance of the boat from the foot of the observation

Ans.Let the distance of the boat from the base of the tower is x m

The angle of the depression = The angle of the elevation = 30°



tan 30° = 240/x

$1/\sqrt{3} = 240/x$

$x = 240\sqrt{3}$ m

(ii)After 10 minutes, the guard observed that the boat was approaching the tower and its distance from tower is reduced by $240(\sqrt{3} - 1)$ m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the observation tower?

Ans.Let the new angle of depression of the boat from the top of the observation tower is θ after 10 minutes

After 10 minutes the distance of the boat is from the base of the tower is

=[240√3 -240(√3 - 1)]m

=240 m

The angle of the depression = The angle of the elevation = θ

tan θ =240/240

tan θ =1 =tan 45°

θ = 45°

CASE STUDY 2

Push-ups are a fast and effective exercise for building strength. These are helpful in almost all sports including athletics. While the push-up primarily targets the muscles of the chest, arms, and shoulders, support required from other muscles helps in toning up the whole body.

Nitesh wants to participate in the push-up challenge. He can currently make 3000 push-ups in one hour. But he wants to achieve a target of 3900 push-ups in 1 hour for which he practices regularly. With each day of practice, he is able to make 5 more push-ups in one hour as compared to the previous day. If on first day of practice he makes 3000 push-ups and continues to practice regularly till his target is achieved. Keeping the above situation in mind answer the following questions:

(i)Form an A.P representing the number of push-ups per day and hence find the minimum number of days he needs to practice before the day his goal is accomplished?

Ans.Let the number of days is n in which he achieves his target

Nitesh currently make 3000 push-ups in one hour

He is able to make 5 more push-ups in one hour as compared to the previous day

He wants to achieve a target of 3900 push-ups in 1 hour for a push-up challenge

The numbers of push up on first day,second day,third day and so on till he achieve 3900 push up per hour

Therefore the AP will be formed as follows

3000,3005,3010,.....3900

Where a =3000,d =5,a_n= 3900

The n^{th} term of an AP is given as

a_n= a +(n -1)d

3900 = 3000 +(n -1)5

5n -5 = 900

5n =905

n =905/5 =181

Hence the minimum number of days is 181 he needs to practice to achieve his goal

(ii)Find the total number of push-ups performed by Nitesh up to the day his goal is achieved.

Ans. Total number of push-ups performed by Nitesh up to the day his goal is achieved=Sum of the AP

The AP of daily push up

3000,3005,3010,.....3900

Where a =3000,d =5,a_n= 3900 and n =181

The sum of n terms of an AP is given by

S = n/2[a +l]

Where n =181, a =3000, l =3900

S=181/2[3000 +3900]

=181/2[6900]

=181×3450=624450

Hence total number of push-ups performed by Nitesh up to the day his goal is achieved is 624450

You can compensate us by donating any amount of money for our survival

Our Paytm No 9891436286

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