CAREERS360

PRACTICE Series

Bihar Board Class 10

Mathematics

Answer Key With Detailed Solution 2025

<u>खण्ड - अ / SECTION - A</u>

<u>वस्तुनिष्ठ प्रश्न / Objective Type Questions</u>

(Q1)

We use the complementary angle identity of trigonometry:

$\sin(90^\circ - A) = \cos A$

Comparing with the given expression, we see that:

$\sin(90^\circ - A) = \cos A$

Hence, the answer is the option (2).

(Q2.)

Given:

$\alpha = \beta = 60^\circ$

We use the trigonometric identity:

$\cos(\alpha - \beta) = \cos 0^\circ$

Since $\cos 0^\circ = 1$, we get:

$\cos(60^\circ - 60^\circ) = \cos 0^\circ = 1$

Hence, the answer is the option (2).

(Q3.)

Given:

$\theta = 45^\circ$

We calculate:

$\sin 45^\circ + \cos 45^\circ$

Since,

$\sin 45^\circ = \frac{1}{\sqrt{2}}, \quad \cos 45^\circ = \frac{1}{\sqrt{2}}$

Adding these values,

$\sin 45^\circ + \cos 45^\circ = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$

Hence, the answer is the option (2),

Ans.4)

We need to evaluate:

$\frac{2\tan A}{1-\tan^2 A}$

Given $A = 30^\circ$, we substitute $\tan 30^\circ = \frac{1}{\sqrt{3}}$:

$\frac{2\times\frac{1}{\sqrt{3}}}{1-\left(\frac{1}{\sqrt{3}}\right)^2}$

Calculating the denominator:

$1 - \frac{1}{3} = \frac{3}{3} - \frac{1}{3} = \frac{2}{3}$

Thus,

$\frac{\frac{2}{\sqrt{3}}}{\frac{2}{3}} = \frac{2}{\sqrt{3}} \times \frac{3}{2} = \frac{6}{2\sqrt{3}} = \frac{3}{\sqrt{3}} = \sqrt{3}$

Since $\tan 60^\circ = \sqrt{3}$, we conclude:

$\frac{2\tan 30^\circ}{1-\tan^2 30^\circ} = \tan 60^\circ$

Hence, the answer is the option (2).

Ans.5)

We are given:

$\tan\theta = \frac{12}{5}$

Using the identity:

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

we consider a right-angled triangle where the opposite side is 12 and the adjacent side is 5 . Using the Pythagorean theorem, the hypotenuse is:

$r = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = \sqrt{169} = 13$

Hence, the answer is the option (2).

Ans 6)

We simplify the given expression:

$$\frac{\cos 59^\circ}{\sin 31^\circ} \times \frac{\tan 80^\circ}{\cot 10^\circ}$$

Using Complementary Angle Identities
We know that:

$$\cos 59^\circ = \sin(90^\circ - 59^\circ) = \sin 31^\circ$$

Thus,

$$\frac{\tan 80^\circ}{\cot 10^\circ} = \tan 80^\circ \times \tan 10^\circ$$

Using the identity:

$$\tan(90^\circ - x) = \cot x$$

we get:

$$\tan 80^\circ = \cot 10^\circ$$

So,

$$\tan 80^\circ \times \tan 10^\circ = \cot 10^\circ \times \tan 10^\circ = 1$$

Hence, the answer is the option (2).

Ans.7)

We are given:

$$\tan 25^\circ \times \tan 65^\circ = \sin A$$

We know that:

$$\tan(90^\circ - x) = \cot x$$

Thus,

$$\tan 65^\circ = \cot 25^\circ$$

$$A = 90^\circ$$

Hence, the answer is the option (3).

Ans.8)

We are given:

$\cos\theta = x$
From the fundamental identity of trigonometry:

$\sin^2\theta + \cos^2\theta = 1$

Substituting $\cos\theta = x$:

$\sin^2\theta + x^2 = 1$
$\sin^2\theta = 1 - x^2$
$\sin\theta = \sqrt{1 - x^2}$
We use the definition of tangent:

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

Substituting values:

$\tan\theta = \frac{\sqrt{1-x^2}}{x}$
Hence, the answer is the option (2).

Ans.9)

We start with the given expression:

$1 - \cos^4\theta$
We use the identity:

$a^2 - b^2 = (a - b)(a + b)$

Rewriting $\cos^4\theta$ as $\left(\cos^2\theta\right)^2$, we get:

$1 - \cos^4\theta = \left(1 - \cos^2\theta\right)\left(1 + \cos^2\theta\right)$

Hence, the answer is the option (2).

Ans.10)

A point lying on the y-axis means that its x-coordinate is always 0 because any point on the y-axis has no horizontal displacement.

Thus, the general form of a point on the y-axis is:

$(0, y)$
Hence, the answer is the option (3).

Ans.11)

For a quadratic equation to have real and equal roots, the discriminant must be zero.
The given quadratic equation is:

$kx^2 - 6x + 1 = 0$

$\Delta = b^2 - 4ac$

For real and equal roots:

$b^2 - 4ac = 0$

Substituting values:

$(-6)^2 - 4(k)(1) = 0$
$36 - 4k = 0$

Hence, the answer is the option (3).

Ans.12)

We are given that one of the zeros of the polynomial $p(x)$ is 2 .

According to the Factor Theorem, if r is a zero of a polynomial $p(x)$, then $(x - r)$ is a factor of $p(x)$.
Since 2 is a zero of $p(x)$, it follows that: $(x - 2)$ is a factor of $p(x)$.

Hence, the answer is the option (1).

Ans.13)

We are given that α and β are the zeros of the quadratic polynomial:

$p(x) = cx^2 + ax + b$
For a quadratic equation of the form:

$ax^2 + bx + c = 0$

the product of the roots $(\alpha\beta)$ is given by:

$\alpha\beta = \frac{\text{constant term}}{\text{leading coefficient}}$

Comparing the given polynomial $cx^2 + ax + b$ with the standard form, we identify:
- Leading coefficient (c)
- Constant term (b)

Thus, the product of the roots is:

$\alpha\beta = \frac{b}{c}$
Hence, the answer is the option (3).

Ans.14)

A quadratic equation is an equation of the form:

$ax^2 + bx + c = 0$

where a, b, c are constants, and $a \neq 0$. Our goal is to check which of the given options can be written in this form.

Option (A):

$(x+3) - (x-3) = x^2 - 4x^3$

Simplify the left-hand side:

$x + 3 - x + 3 = 6$

So, the equation becomes:

$6 = x^2 - 4x^3$

Rearrange:

$4x^3 - x^2 + 6 = 0$
This is a cubic equation (highest power of x is 3), not quadratic.

Option (B):

$(x+3)^2 = 4(x+4)$

Expanding both sides:

$x^2 + 6x + 9 = 4x + 16$

Rearrange:

$$x^2 + 6x + 9 - 4x - 16 = 0$$
$$x^2 + 2x - 7 = 0$$

This is a quadratic equation.

Option (C):

$(2x-2)^2 = 4x^2 + 7$

Expanding the left-hand side:

$4x^2 - 8x + 4 = 4x^2 + 7$

Rearrange:

$$\begin{aligned} 4x^2 - 8x + 4 - 4x^2 - 7 = 0 \\ -8x - 3 = 0 \\ 8x = -3 \\ x = -\frac{3}{8} \end{aligned}$$

This is a linear equation (not quadratic).

Option (D):

$4x + \frac{1}{4x} = 4x$

Subtract $4x$ from both sides:

$\frac{1}{4x} = 0$

Multiplying both sides by $4x$:

$1 = 0$

This is not a valid equation, so it is not quadratic.

Hence, the answer is the option (2).

Ans.15)

We need to determine which of the given options is not a quadratic equation. A quadratic equation is in the form:

$ax^2 + bx + c = 0$

where the highest power of x is 2 .

Option (A):

$5x - x^2 = x^2 + 3$

Rearrange:

$$5x - x^2 - x^2 - 3 = 0$$
$$-2x^2 + 5x - 3 = 0$$

This is a quadratic equation (degree 2).

Option (B):

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

Expanding $(x-1)^3$:

$$x^3 - 3x^2 + 3x - 1$$

So, the equation becomes:

$$x^3 - x^2 - x^3 + 3x^2 - 3x + 1 = 0$$

Simplify:

$$-x^2 + 3x^2 - 3x + 1 = 0$$
$$2x^2 - 3x + 1 = 0$$

This is a quadratic equation (degree 2).

Option (C):

$$(x+3)^2 = 3\left(x^2 - 5\right)$$

Expanding both sides:

$$x^2 + 6x + 9 = 3x^2 - 15$$

Rearrange:

$$x^2 + 6x + 9 - 3x^2 + 15 = 0$$
$$-2x^2 + 6x + 24 = 0$$

This is a quadratic equation (degree 2).

Option (D):

$$(\sqrt{2}x + 3)^2 = 2x^2 + 5$$

Expanding the left-hand side:

$$2x^2 + 6\sqrt{2}x + 9 = 2x^2 + 5$$

Rearrange:

$$2x^2+6\sqrt{2}x+9-2x^2-5=0$$
$$6\sqrt{2}x+4=0$$
$$6\sqrt{2}x=-4$$
$$x=-\frac{4}{6\sqrt{2}}=-\frac{2}{3\sqrt{2}}$$
This is a linear equation (highest degree of x is 1, not 2).

Hence, the answer is the option (4).

Ans.16)

The discriminant (Δ) of a quadratic equation of the form:

$ax^2+bx+c=0$

is given by the formula:

$\Delta=b^2-4ac$
From the given equation:

$2x^2-7x+6=0$

we have:
- $a=2$
- $b=-7$
- $c=6$

$\Delta=(-7)^2-4(2)(6)$

$=49-48$
$=1$

Hence, the answer is the option (1).

Ans.17)

The equation given is:

$x=2$

Understanding the Graph:
- This equation represents a vertical line passing through $x=2$, meaning all points on this line have their x-coordinate as 2 , while the y-coordinate can be any real number.

Checking Given Points:
1. Option (A): $(2,0)$
$x=2$ Lies on the line.
2. Option (B): $(2,1)$
$x=2$ Lies on the line.

3. Option (C): $(2, 2)$
$x = 2$ Lies on the line.

all these points satisfy $x = 2$

Hence, the answer is the option (4).

Ans.18)

We are given that the numbers:

$$P + 1, \quad 2P + 1, \quad 4P - 1$$

are in Arithmetic Progression (A.P.).
In an arithmetic progression, the common difference between consecutive terms is the same. That is,

Second term - First term = Third term - Second term
Substituting the given terms:

$$(2P + 1) - (P + 1) = (4P - 1) - (2P + 1)$$
Simplifying both sides:

$$2P + 1 - P - 1 = 4P - 1 - 2P - 1$$
$$P = 2P - 2$$

Hence, the answer is the option (2).

Ans.19)

In an Arithmetic Progression (A.P.), the common difference (d) is given by:

$$d = \text{ Second term } - \text{ First term}$$

For the given A.P.:

$$1, 5, 9, \ldots$$

Calculating the common difference:

$$d = 5 - 1 = 4$$

Hence, the answer is the option (3).

Ans.20)

We are given the arithmetic progression (A.P.):

$5, 8, 11, 14, \ldots$
- First term: $a = 5$
- Common difference:

$d = 8 - 5 = 3$

$$\begin{aligned} 38 - 5 &= (n-1) \times 3 \\ 33 &= (n-1) \times 3 \\ n - 1 &= \frac{33}{3} = 11 \\ n &= 12 \end{aligned}$$

Hence, the answer is the option (3).

Ans.21)

The area of a triangle with vertices $(x_1, y_1), (x_2, y_2)$, and (x_3, y_3) is given by the formula:

$\text{Area} = \frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$

From the given vertices:
- $A(0,1)$
- $B(0,5)$

- $C(3,4)

$$\begin{aligned} \text{Area} &= \frac{1}{2}|0(5-4) + 0(4-1) + 3(1-5)| \\ &= \frac{1}{2}|0 + 0 + 3(-4)| \\ &= \frac{1}{2}|-12| \end{aligned}$$

$= \frac{1}{2} \times 12 = 6$

Hence, the answer is the option (3).

Ans.22)

We need to evaluate:

$\tan 10^\circ \cdot \tan 23^\circ \cdot \tan 80^\circ \cdot \tan 67^\circ$
We use the identity:

$\tan(90^\circ - x) = \cot x$

Applying this:

$\tan 80^\circ = \cot 10^\circ$

$\tan 67^\circ = \cot 23^\circ$

Thus, rewriting the given expression:

$\tan 10^{\circ} \cdot \tan 23^{\circ} \cdot \cot 10^{\circ} \cdot \cot 23^{\circ}$
Using $\tan x \cdot \cot x = 1$, we get:

$$(\tan 10^{\circ} \cdot \cot 10^{\circ}) \times (\tan 23^{\circ} \cdot \cot 23^{\circ})$$
$$1 \times 1 = 1$$

Hence, the answer is the option (2).

Ans.23)

We are given that the ratio of areas of two similar triangles is:

100 : 144
For two similar triangles, the ratio of their areas is equal to the square of the ratio of their corresponding sides. That is:

$$\left(\frac{\text{side }_1}{\text{side }_2}\right)^2 = \frac{\text{area }_1}{\text{area }_2}$$

Substituting the given area ratio:

$$\left(\frac{\text{side }_1}{\text{side }_2}\right)^2 = \frac{100}{144}$$

$$\frac{\text{side}_1}{\text{side}_2} = \sqrt{\frac{100}{144}}$$
$$= \frac{\sqrt{100}}{\sqrt{144}} = \frac{10}{12}$$
$$= \frac{5}{6}$$

Hence, the answer is the option (3).

Ans.24)

A line that intersects a circle in two distinct points is called a secant.

Hence, the answer is the option (2).

Ans.25)

We are given that the ratio of the corresponding sides of two similar triangles is:

4 : 9
For two similar triangles, the ratio of their areas is equal to the square of the ratio of their corresponding sides:

$$\left(\frac{\text{Area }_1}{\text{Area }_2}\right) = \left(\frac{\text{Side }_1}{\text{Side }_2}\right)^2$$

Hence, the answer is the option (2).

Ans.26)

We are given that $\triangle ABC \sim \triangle DEF$, and we know the property:

$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{\text{Side } BC}{\text{Side } EF}\right)^2$

- $BC = 3$ cm
- $EF = 4$ cm
- Area of $\triangle ABC = 54 \text{ cm}^2$

- Area of $\triangle DEF = ?$

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{3}{4}\right)^2$$
$$\frac{54}{\text{Area of } \triangle DEF} = \frac{9}{16}$$

$$\text{Area of } \triangle DEF = \frac{54 \times 16}{9}$$
$$= \frac{864}{9} = 96 \text{ cm}^2$$

Hence, the answer is the option (2).

Ans.27)

We are given a right-angled triangle $\triangle ABC$ where:
- $\angle A = 90^\circ$
- Hypotenuse $BC = 13$ cm
- One leg $AB = 12$ cm
- We need to find the other leg AC.

The Pythagorean Theorem states that in a right-angled triangle:

$BC^2 = AB^2 + AC^2$

Substituting the given values:

$13^2 = 12^2 + AC^2$
$169 = 144 + AC^2$
$AC^2 = 169 - 144$
$AC^2 = 25$
$AC = \sqrt{25} = 5$

Hence, the answer is the option (2).

Ans.28)

We are given two triangles $\triangle DEF$ and $\triangle PQR$ with the given conditions:

$$\angle D = \angle Q \quad \text{and} \quad \angle R = \angle E$$

The angle sum property of a triangle states:

$$\angle D + \angle E + \angle F = 180^\circ$$
$$\angle P + \angle Q + \angle R = 180^\circ$$

Since $\angle D = \angle Q$ and $\angle R = \angle E$, we substitute these into the equation:

$$\angle Q + \angle E + \angle F = 180^\circ$$

Hence, the answer is the option (1).

Ans.29)

We are given that $\triangle ABC \sim \triangle DEF$ because:

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{DF}$
Since the triangles are similar, their corresponding angles are equal, i.e.,

$$\angle A = \angle D, \quad \angle B = \angle E, \quad \angle C = \angle F$$

We are given:

$$\angle A = 40^\circ, \quad \angle B = 80^\circ$$

Using the angle sum property of a triangle:

$$\angle A + \angle B + \angle C = 180^\circ$$

Substituting the given values:

$$40^\circ + 80^\circ + \angle C = 180^\circ$$
$$\angle C = 180^\circ - 120^\circ = 60^\circ$$
Since $\triangle ABC \sim \triangle DEF$, the corresponding angle to $\angle C$ is $\angle F$:

$$\angle F = \angle C = 60^\circ$$

Hence, the answer is the option (3).

Ans.30)

- Two circles can have up to 4 common tangents: two external and two internal.
- If the circles intersect, then the internal tangents do not exist, because they would have to pass through the region of intersection.
- The only valid common tangents are the two external tangents.

(B) 2

Hence, the answer is the option (2).

Ans.31)

We are given that the ratio of the volumes of two spheres is:

$\frac{V_1}{V_2} = \frac{64}{125}$

The volume of a sphere is given by:

$V = \frac{4}{3}\pi r^3$

For two spheres with radii r_1 and r_2, the ratio of their volumes is:

$\left(\frac{r_1}{r_2}\right)^3 = \frac{64}{125}$

Taking the cube root on both sides:

$\frac{r_1}{r_2} = \frac{\sqrt[3]{64}}{\sqrt[3]{125}} = \frac{4}{5}$

The surface area of a sphere is given by:

$S = 4\pi r^2$

For two spheres, the ratio of their surface areas is:

$\left(\frac{r_1}{r_2}\right)^2 = \left(\frac{4}{5}\right)^2 = \frac{16}{25}$

so, 16 : 25

Hence, the answer is the option (3).

Ans.32)

We are given that the radı of two cylinders are in the ratıo:

$\frac{r_1}{r_2} = \frac{4}{5}$

and their heights are in the ratio:

$\frac{h_1}{h_2} = \frac{6}{7}$

The volume of a cylinder is given by:

$V = \pi r^2 h$

For two cylinders, the ratio of their volumes is:

$$\frac{V_1}{V_2} = \frac{\pi r_1^2 h_1}{\pi r_2^2 h_2}$$

Canceling π :

$$\frac{V_1}{V_2} = \frac{r_1^2 h_1}{r_2^2 h_2}$$

$\backslash \text{ frac } \left\{\bigvee\_1\right\}\left\{\bigvee\_2\right\} = \backslash \text{ frac } \{(4/5)\hat{}2$

$$= \frac{16}{25} \times \frac{6}{7}$$

$$= \frac{16 \times 6}{25 \times 7} = \frac{96}{175}$$

96 : 175

Hence, the answer is the option (2).

Ans.33)

The total surface area of a hemisphere includes:
1. Curved Surface Area (CSA):

The curved surface area of a hemisphere is given by:

$$\text{CSA} = 2\pi R^2$$

2. Base Area (which is a circular region of radius R):

$$\text{Base Area } = \pi R^2$$

$$\text{Total Surface Area } = \text{CSA} + \text{ Base Area}$$
$$= 2\pi R^2 + \pi R^2$$
$$= 3\pi R^2$$

Hence, the answer is the option (3).

Ans.34)

The curved surface area (CSA) of a cone is given by the formula:

$$\text{CSA} = \pi r l$$

where:
- r is the radius of the base,
- l is the slant height, and
- π is approximately 3.14 .

Step 1: Identify Given Values
We are given:
- Curved Surface Area (CSA) $= 880 \mathrm{~cm}^2$
- Radius $(r) = 14 \mathrm{~cm}$

- Slant height $(\mathrm{I}) =$?

$880 = \pi \times 14 \times l$

Approximating π as $22/7$:

$$880 = \frac{22}{7} \times 14 \times l$$
$$880 = \frac{308}{7} \times l$$
$$880 \times 7 = 308l$$
$$6160 = 308l$$

$$l = \frac{6160}{308}$$
$$l = 20 \mathrm{~cm}$$

Hence, the answer is the option (2).

Ans.35)

The space diagonal (d) of a cube with edge length a is given by:

$d = a\sqrt{3}$

We are given that the diagonal is:

$d = 2\sqrt{3} \mathrm{~cm}$
Using the formula:

$a\sqrt{3} = 2\sqrt{3}$

Dividing both sides by $\sqrt{3}$:

$a = 2$
Hence, the answer is the option (1).

Ans.36)

The total surface area (TSA) of a cube with edge length a is:

$\mathrm{TSA} = 6a^2$
Let the initial edge length be a, then the initial total surface area is:

$\text{TSA}_{\text{initial}} = 6a^2$

If the edge is doubled, the new edge length becomes:

$2a$
The new total surface area is:

$$\begin{aligned} \text{TSA}_{\text{new}} &= 6(2a)^2 \\ &= 6 \times 4a^2 \\ &= 24a^2 \end{aligned}$$

$\frac{\text{TSA}_{\text{new}}}{\text{TSA}_{\text{initial}}} = \frac{24a^2}{6a^2} = 4$

Hence, the answer is the option (2).

Ans.37)

We need to find the ratio of the total surface area of a sphere to that of a hemisphere having the same radius R.
The total surface area of a sphere of radius R is:

$\text{TSA}_{\text{sphere}} = 4\pi R^2$
A hemisphere has:
1. Curved Surface Area (CSA):

$\text{CSA} = 2\pi R^2$

$\text{Base Area} = \pi R^2$

Thus, the total surface area of the hemisphere is:

$\text{TSA}_{\text{hemisphere}} = \text{CSA} + \text{Base Area} = 2\pi R^2 + \pi R^2 = 3\pi R^2$

$\frac{\text{TSA}_{\text{sphere}}}{\text{TSA}_{\text{hemisphere}}} = \frac{4\pi R^2}{3\pi R^2}$

Cancel πR^2 :

$= \frac{4}{3}$

Hence, the answer is the option (4).