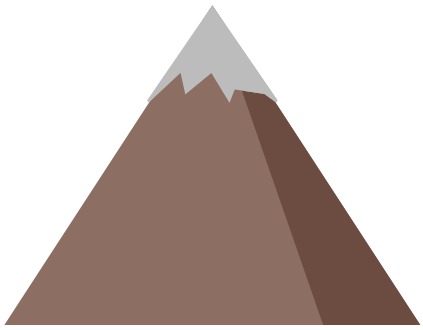
GRADE 7-8 QUESTIONS AND SOLUTIONS

Q1:



Before climbing the mountain, Richard measured the temperature with a thermometer and noted that the temperature was 8°C. Given that the temperature drops by 1°C for every 100 meters of elevation, at what altitude (in meters) is Richard when he measures the temperature to be -2°C? (1 points)

A) 800 B) 9000 C) 1000 D)1200

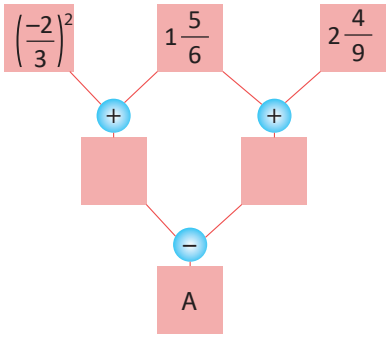
Q2:

+	–3	–1	+7
–4	–7	■	+4
–2	–5	–3	★
+5	▲	●	+12

What is the value of ▲ + ● + ■ + ★ ? (1 points)

A) –4 B) +2 C) +6 D) +10

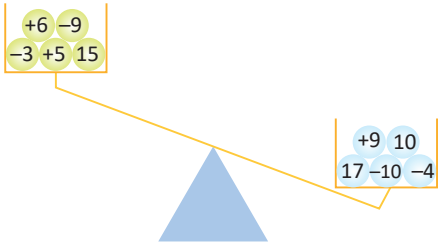
Q3:



What is the result of A? (1 points)

A) –2 B) –3 C) 2 D) 3

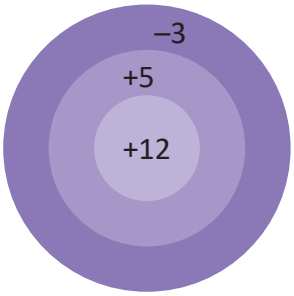
Q4:



For the balance scale above to be balanced, the sum of the numbers on both sides must be equal. Which two integers need to be swapped to bring the scale into balance? (1 points)

A) (–3) and (–10)
B) 15 and 17
C) +6 and +10
D) (–9) and +9

Q5:

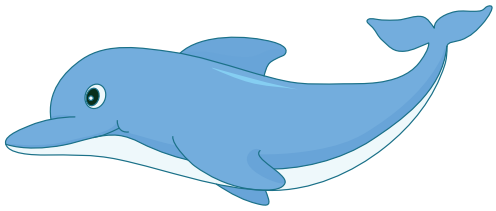


Bob will take 5 shots at the target, and he has hit each region at least once. What is the highest possible score Bob can achieve?

(1 points)

A) –15 B) 8 C) 60 D) 38

Q6:



A dolphin dives 10 meters below sea level, then returns to sea level, and jumps 4 meters above sea level. How many meters does the dolphin travel in total when it returns to sea level?

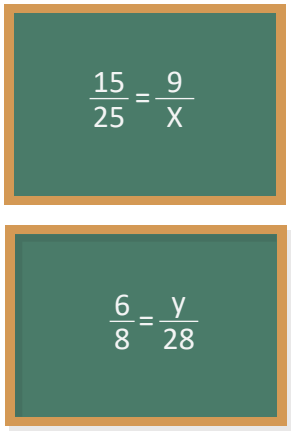
(2 points)

A) 10 B) 20 C) 24 D) 28

Q7: **In a 23-question exam, each correct answer is awarded +7 points, and each incorrect answer results in -3 points. A person who answered all the questions received a total of 91 points. How many questions did this person answer correctly? (2 points)**

A) 14 B) 16 C) 18 D) 20

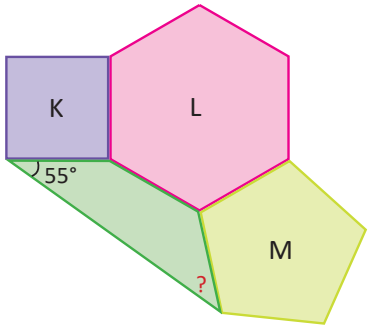
Q8:



According to the proportions written on the boards above, what is the value of the ratio $\frac{x}{y}$? (2 points)

A) $\frac{7}{5}$ B) $\frac{5}{7}$ C) $\frac{5}{16}$ D) $\frac{3}{4}$

Q9:



Find '?'. (2 points)

A) 16 B) 23 C) 30 D) 34

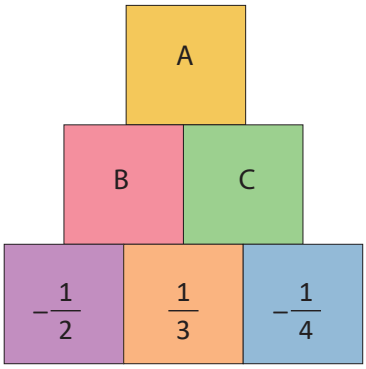
Q10: The following information is given about the numbers A and B:

- The number 12 is %A of 60.
- The number 54 is %B of 600.

Accordingly, what percentage of %A is %B? (2 points)

A) 35 B) 42 C) 45 D) 55

Q11:



What is the value of the 2A + B – C? (3 points)

A) $\frac{1}{2}$ B) $-\frac{1}{12}$ C) $-\frac{5}{12}$ D) $\frac{5}{12}$

Q12: In a car rental company, the cars are either 2-seaters or 5-seaters. A tourist group of 22 people will rent 8 vehicles.

How many of these vehicles are 2-seaters? (3 points)

A) 2 B) 4 C) 5 D) 6

Q13: If the long side of a rectangular garden increases by 20% and the short side decreases by 10%, how does the area of the garden change? (3 points)

A) Decreases by 10%
B) Decreases by 8%
C) Increases by 10%
D) Increases by 8%

Q14: **In a farm, the number of rabbits doubles every 6 months. How many rabbits will be on the farm after 5 years, starting with 256 rabbits?**

(It is assumed that no rabbits die during this period.)

(3 points)

A) 2^{16} B) 2^{17} C) 2^{18} D) 2^{19}

Q15: ○ $= (-10)^4$ ❀ $= \left(\frac{1}{10}\right)^{-3}$

□ $= (-100)^3$ ❖ $= (100)^0$

If the numbers equated with the shapes above are arranged from smallest to greatest, what shape is formed? **(3 points)**

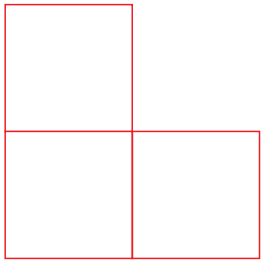
A) ❀, □, ○, ❖

B) ❖, □, ○, ❀

C) ○, ❖, □, ❀

D) □, ❖, ❀, ○

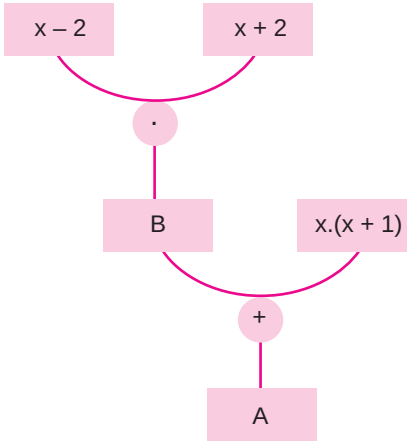
Q16:



What is the perimeter of this shape made up of equal squares, each with an area of 50 cm²? **(4 points)**

A) $16\sqrt{2}$ B) $24\sqrt{2}$ C) $32\sqrt{2}$ D) $40\sqrt{2}$

Q17:



Find the value of A. **(4 points)**

A) $2x^2 + 4x + 4$

B) $2x^2 + 4x - 4$

C) $2x^2 + 2x - 2$

D) $2x^2 + 2x + 2$

Q18: I. $(x + 2)$

II. $(x - 2)$

III. $(x + 5)$

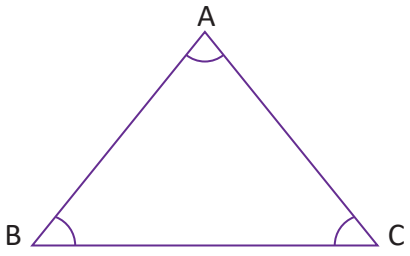
IV. $(x - 5)$

Which two of the given algebraic expressions multiply to equal $x^2 - 3x - 10$.? (4 points)

A) I and II B) I and IV

C) II and III D) III and IV

Q19:



In the isosceles triangle above,

$|AB| = |BC|$

$\widehat{BAC} = 2x-30$

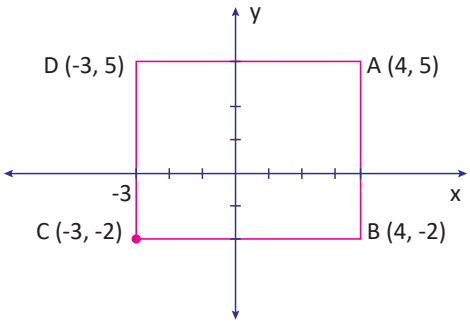
$\widehat{BCA} = x+10$

$\widehat{ABC} = 4y+20$

What is the value of y in degrees? (4 points)

A) 15 B) 30 C) 45 D) 60

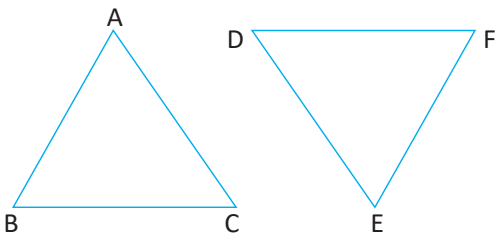
Q20:



What is the perimeter of the rectangle ABCD given above? (4 points)

A) 16 B) 28 C) 32 D) 45

Q21:



The triangles given above are similar triangles ($ABC \cong DEF$).

$|AB| = 2x - 7$,

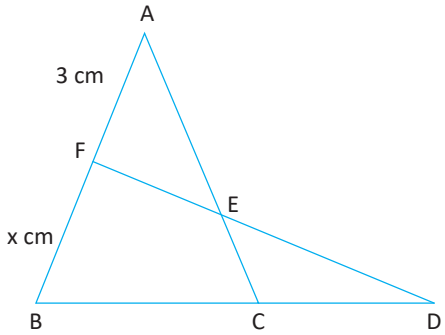
$|AC| = 9$ cm,

$|DE| = 5$ cm, and $|DF| = 3y - 6$ cm.

What is the value of x + y? (4 points)

A) 9 B) 10 C) 11 D) 12

Q22:



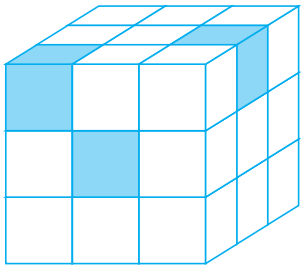
Given the triangle ABC, with B, C, and D being collinear and D, E, F being collinear, and the following conditions:

- $|AE| = 3 \times |EC|$
- $|BC| = 4|CD|$
- $|AF| = 3$ cm

What is the length of $|FB| = x$ cm? (5 points)

A) 2 B) 4 C) 12 D) 6

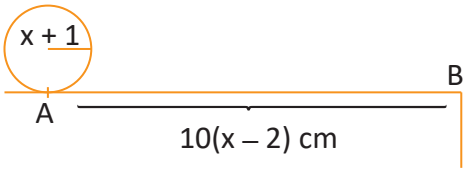
Q23:



A cube with a side length of 'a' units has been formed by combining smaller cubes as shown above. If three small painted cubes are removed from the shape above, how will the surface area of the new shape change? (5 points)

A) Increased by $6a^2$
B) Decreased by $6a^2$
C) Decreased by $5a^2$
D) Same

Q24:



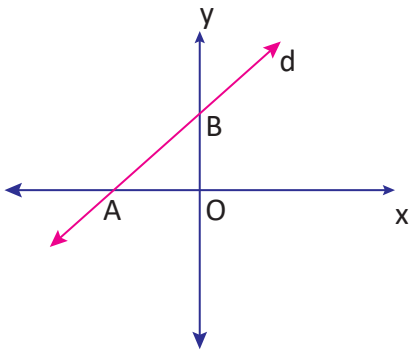
The circumference of a circle with a radius of pr is $2pr^2$.

A wheel with a radius of (x + 1) cm starts at point A and makes one full rotation to reach point B, falling off the edge at point B.

What is the maximum integer value that x can take? (5 points)

A) 6 B) 5 C) 4 D) 3

Q25:



In the Cartesian coordinate system, the slope of the given line d is $\frac{5}{3}$.

Given that the area of triangle AOB is 270 cm², what is the length of |AO|? (5 points)

A) 6 B) 12 C) 18 D) 30

Q26:

Zoe is climbing to a peak at a height of 600 meters with a slope of 75%. How many horizontal meters has Zoe traveled when she reaches the summit? (6 points)

A) 300 B) 450 C) 600 D) 800

Q27: In the equation ax + b = ax + c, if b ≠ c, then the equation has no solution for x.

Given the equation:

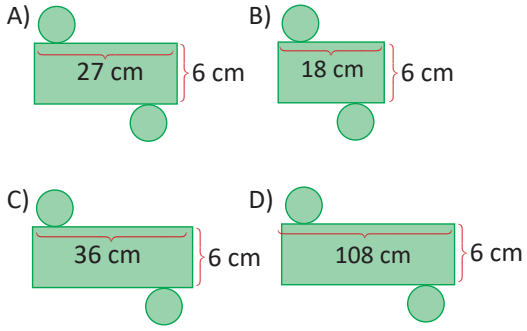
2.(x – 3) = (2a – 6)x – 8

It is stated that this equation has no solution.

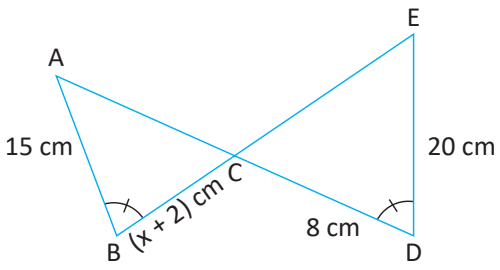
Accordingly, what is the value of ña? (6 points)

A) 1 B) 2 C) 3 D) 4

Q28: Which of the following is the net (unfolded) shape of a cylinder with a diameter and height of 6 cm? (Use p = 3) **(6 points)**



Q29:



In the triangles $\widehat{ABC}$ and $\widehat{CDE}$ given above:

- $m(\widehat{ABC}) = m(\widehat{CDE})$
- |CD| = 8 cm, |DE| = 20 cm
- |AB| = 15 cm, and |BC| = (x + 2) cm

What is the value of x? (6 points)

A) 20 B) 40 C) 60 D) 80

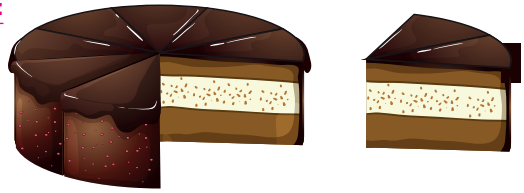
Q30: Below, there are cards numbered from 1 to n.

The probability that a randomly selected card from these cards has a number that is a positive multiple of 3 is $\frac{1}{4}$.

Based on this, what is the maximum value of n? **(6 points)**

A) 4 B) 8 C) 12 D) 20

Q31:



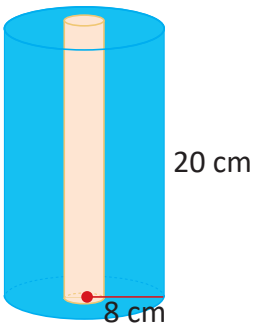
Daniel distributes a cylindrical cake with a diameter of 20 cm and a height of 20 cm, which he received for his birthday, into 8 pieces to his friends.

According to this, what is the volume of the piece that one of his friends eats? (Take p = 3.) **(7 points)**

A) 1000 cm³ B) 750 cm³

C) 500 cm³ D) 250 cm³

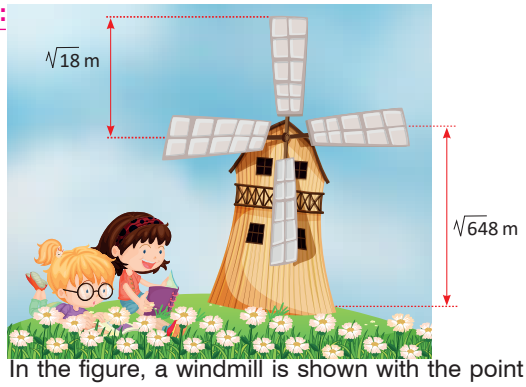
Q32:



How many times the volue of the remaining part the larger cylinder is greater than tehe volume of the removed part? **(7 points)**

A) 25 B) 20 C) 15 D) 10

Q33:

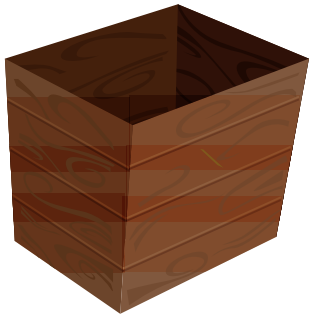


In the figure, a windmill is shown with the point where the blades meet and its height from the ground.

Given that each blade of the windmill is $\sqrt{18}$ meters long, how far is the closest point of the blades to the ground? **(7 points)**

A) $5\sqrt{2}$ B) $10\sqrt{2}$ C) $15\sqrt{2}$ D)$25\sqrt{2}$

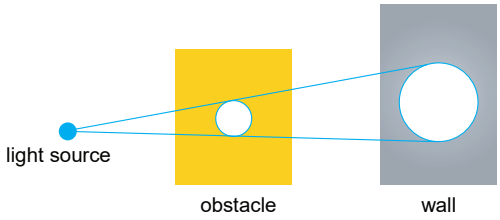
Q34:



An open-top wooden box in the shape of a cube is intended to be made as shown above. Given that a total of 90 cm^2 of wood is used, what is the length of one edge of this box? (7 points)

A) 15 B) 90 C) 18 D) $3\sqrt{2}$

Q35:



A right circular cylinder with a height of 20 cm and A light source, as shown in the figure, is held in front of an obstacle that has a circular hole with a diameter of 10 cm. This creates a circular light spot with an area of 432 cm^2 on the opposite wall.

Given that the distance from the obstacle to the light source is 5 meters, how far is the obstacle from the wall? (Take p = 3.) **(7 points)**

A) 5 m B) 7 m
C) 12 m D) 24 m

GRADE 7-8 QUESTIONS AND SOLUTİONS

ANSWER IS C

SOLUTION:

Q1: Initial Temperature: 8°C

Final Temperature: –2°C

Temperature Drop: 8 – (–2) = 8 + 2 = 10°C

Since the temperature drops by 1°C for every 100 meters:

Altitude Increase Corresponding to Temperature Drop: 10 °C × 100 meters /°C = 1000 meters

ANSWER IS C

SOLUTION:

Q2: (–4) + (–1)= -5

(–2) + 7= 5

+5 + (–3) = 2

+5 + (–1) = 4

Their sum is: (–5) + 5 + 2 + 4 = +6

ANSWER IS A

SOLUTION:

Q3:

- $\left(\frac{2}{3}\right)^2 = \left(\frac{4}{9}\right)$
- $1 + \left(\frac{5}{6}\right) = \left(\frac{11}{6}\right)$
- $2 + \left(\frac{4}{9}\right) = \left(\frac{22}{9}\right)$

Add the left and right branches:

Left branch: $\left(\frac{4}{9}\right) + \left(\frac{11}{6}\right) = \frac{4 \times 2}{18} + \frac{11 \times 3}{18} = \frac{41}{18}$

Right branch: $\left(\frac{11}{6}\right) + \left(\frac{22}{9}\right) = \frac{11 \times 3}{18} = \frac{22 \times 2}{18} = \frac{77}{18}$

Subtract the right branch from the left branch:

$\frac{41}{18} - \frac{18}{77} = \frac{-36}{18} = -2$

ANSWER IS C

SOLUTION:

Q4: Left side sum:

6 + (–9) + (–3) + 5 + 15 = 6 – 9 – 3 + 5 + 15 = 14

Right side sum:

9 + 10 + 17 + (–10) + (–4) = 9 + 10 + 17 – 10 – 4 = 22

The difference between the two sides is: 22 – 14 = 8

We need to swap one number from the left side with one from the right side to make the sums equal.

Swapping 15 from the left side with 9 from the right side:

- New left side sum: 14 – 15 + 9 = 8
- New right side sum: 22 – 9 + 15 = 28
- This does not balance the scale.

Swapping 6 from the left side with 10 from the right side:

- New left side sum: 14 – 6 + 10 = 18
- New right side sum: 22 – 10 + 6 = 18
- Swapping 15 from the left side with 17 from the right side:
- New left side sum: 14 – 15 + 17 = 16
- New right side sum: 22 – 17 + 15 = 20
- This also doesn't balance the scale.

So, 6 from the left side and 10 from the right side should be swapped to balance the scale.

ANSWER IS D

SOLUTION:

Q5: Since Bob must hit each region at least once and he has 5 shots in total, the goal is to maximize his score.

- Hit the +12 region 3 times.
- Hit the +5 region 1 time.
- Hit the –3 region 1 time.

Calculation:

$3x + 12 = +36$

$1x + 5 = +5$

$1 \times -3 = -3$

Total score: $36+5-3=38$

Thus, the maximum possible score Bob can achieve is 38.

ANSWER IS D

SOLUTION:

Q6: Diving Below Sea Level:

- The dolphin goes 10 meters down.

Returning to Sea Level:

- The dolphin travels 10 meters up to return to sea level.

Jumping Above Sea Level:

- The dolphin jumps 4 meters above sea level.

Returning to Sea Level:

- The dolphin travels 4 meters down to return to sea level.

Total Distance:

- Downward dive: 10 meters
- Upward return: 10 meters
- Upward jump: 4 meters
- Downward return: 4 meters

Adding these distances:

$10 + 10 + 4 + 4 = 28$ meters

Thus, the dolphin travels a total of 28 meters.

ANSWER IS B

SOLUTION:

Q7:

- x as the number of correct answers.
- y as the number of incorrect answers.

We know the following:

The total number of questions is 23: $x+y=23$

The total score is 91 points: $7x-3y=91$

From the first equation:

$y = 23 - x$

$7x - 3(23 - x) = 91$

$7x - 69+3x = 91$

$10x - 69 = 91$

$10x = 160$

$x = 16$

The person answered 16 questions correctly.

ANSWER IS B

SOLUTION:

Q8: : Solve for x in the first proportion:

$$\frac{15}{25} = \frac{9}{x}$$

Cross-multiply to solve for x:

$15x = 25 \times 9$

$15X = 225$

$$X = \frac{225}{15} = 15$$

Solve for y in the second proportion.

$$\frac{6}{8} = \frac{Y}{28}$$

Cross-multiply to solve for y:

$6 \times 28 = 8Y$

$168 = 8Y$

$$Y = \frac{168}{8} = 21$$

Find the ratio X/Y.

$$\frac{X}{Y} = \frac{15}{21}$$

Simplify the ratio:

$$\frac{15}{21} = \frac{5}{4}$$

So, the ratio $\frac{X}{Y}$ is $\frac{5}{4}$.

ANSWER IS B

SOLUTION:

Q9: Square K: Internal angles are 90°
Hexagon L: Internal angles are 120°
Pentagon M: Internal angles are 108°

90° +120° = 210°

360° – 210° =150°

120° +108° = 228°

360° – 228° =132°

So, 132° +150° + 55° + ? = 360°

360° – 337° = 23°

ANSWER IS C

SOLUTION:

Q10: 12 is %A of 60: $\frac{B}{100} \times 60 = 12$

Solve for A: 60A =1200

$A = \frac{1200}{60} = 20$

54 is %B of 600 : $\frac{B}{100} \times 600 = 54$

Solve for B : 600B = 5400

$B = \frac{5400}{600} = 9$

Now, we want to find what percentage B is of A:

$\frac{B}{A} \times 100 = \frac{9}{20} \times 100 = 45\%$

B is 45% of A.

ANSWER IS C

SOLUTION:

Q11: B is above the purple and orange squares, so:

$B = -\frac{1}{2} + \frac{1}{3} = -\frac{3}{6} + \frac{2}{6} = -\frac{1}{6}$

C is above the orange and blue squares, so:

$C = \frac{1}{3} + -\frac{1}{4} = \frac{4}{12} - \frac{3}{12} = \frac{1}{12}$

Now, A is directly above B and C, so:

$A = B + C = -\frac{1}{6} + \frac{1}{12} = -\frac{2}{12} + \frac{1}{12} = -\frac{1}{12}$

$2A + B - C = -\frac{2}{12} + -\frac{2}{12} - \frac{1}{12} = -\frac{5}{12}$

ANSWER IS D

SOLUTION:

Q12: Let the number of 2-seater cars be x and the number of 5-seater cars be y.

We have the following conditions:

1. The total number of cars is 8:

$x + y = 8$

2. The total number of people is 22:

$2x + 5y = 22$

Now, let's solve these equations:

From the first equation, we can express y in terms of x:

$y = 8 - x$

Substitute this into the second equation:

$2x + 5(8 - x) = 22$

Distribute the 5:

$2x + 40 - 5x = 22$

Combine like terms:

$-3x + 40 = 22$

Subtract 40 from both sides:

$-3x = -18$

Divide by –3:

$x = 6$

So, x = 6, meaning there are 6 cars that are 2-seaters.

ANSWER IS D

SOLUTION:

Q13: The original area of the garden is:

Original Area = L×W

After the changes:

- The long side increases by 20%, so the new length of the long side is: Lnew = L × (1 + 0.20) =1.20L
- The short side decreases by 10%, so the new length of the short side is: Wnew = W × (1 – 0.10) = 0.90W

The new area of the garden is:

New Area = Lnew × Wnew = 1.20L× 0.90W = 1.08 × (L × W)

The new area is 1.08 times the original area, which means the area of the garden increases by 8%.

ANSWER IS C

SOLUTION:

Q14: 5 years = 5 × 12 months = 60 months

Number of 6-month periods = 60 months / 6 months/ period = 10 periods

Since the number of rabbits doubles every 6 months, we use the formula:

Final number of rabbits

= Initial number of rabbits × $2^{\text{number of periods}}$

Final number of rabbits = $256 \times 2^{10} = 2^8 \times 2^{10} = 2^{18}$

ANSWER IS D

SOLUTION:

Q15: Circle: $(-10)^4=10{,}000$

Since the exponent is even, the result is positive.

Clover: $\left(\frac{1}{10}\right)^{-3} = 10^3 = 1{,}000$

The negative exponent flips the fraction and raises it to the power of 3.

Square: $(-100)^3 = -1{,}000{,}000$

Since the exponent is odd, the result is negative.

Diamond: $(100)^0 = 1$

Any number to the power of 0 is 1.

The order of shapes from smallest to largest is:

❒ → ✣ → ♣ → ❍

ANSWER IS D

SOLUTION:

Q16: Side length of each square = $\sqrt{50} = 5\sqrt{2}$ cm

The total perimeter P is the sum of all the outer sides:

$P = 2 \times (2 \times 5\sqrt{2}) + 2 \times 5\sqrt{2}$

Simplifying:

$P = 4 \times 5\sqrt{2} + 4 \times 5\sqrt{2} = 40\sqrt{2}$ cm

ANSWER IS C

SOLUTION:

Q17: $B = (x - 1) \times (x + 2) = x^2 + x - 2$

First, let's expand $x \times (x + 1)$: $x(x + 1) = x^2 + x$

Now, add $B = x^2 + x - 2$ to $x^2 + x$:

$A = (x^2 + x - 2) + (x^2 + x) = 2x^2 + 2x - 2$

So, $A = 2x^2 + 2x - 2$.

ANSWER IS B

SOLUTION:

Q18: We want to factor the quadratic expression:

$x^2 - 3x - 10$

We need to find two numbers that multiply to −10 and add to −3.

These numbers are −5 and 2. Therefore, we can factor the quadratic expression as:

$x^2 - 3x - 10 = (x - 5)(x + 2)$

ANSWER IS A

SOLUTION:

Q19: Given that triangle ABC is isosceles with $|AB| = |BC|$, the angles opposite these equal sides are also equal:

$\widehat{BAC} = \widehat{BCA}$

$2x - 30° = x + 10°$

$x = 40°$

Since the sum of the interior angles in any triangle is 180°, we have:

$\widehat{BAC} + \widehat{BCA} + \widehat{ABC} = 180°$

$\widehat{BAC} = \widehat{BCA} = 50°$

$\widehat{ABC} = 4y + 20° = 80°$

$4y = 60°$

$y = 15°$

ANSWER IS B

SOLUTION:

Q20: Length of side AB (horizontal side):

- The coordinates of A are (4, 5) and the coordinates of B are (4, −2).
- The length of AB is the difference in the y-coordinates because AB is a vertical line:

$AB = |5-(-2)| = 5 + 2 = 7$

Length of side BC (vertical side):

- The coordinates of B are (4,−2) and the coordinates of C are (−3,−2).
- The length of BC is the difference in the x-co-ordinates because BC is a horizontal line:

$BC = |4-(-3)| = 4 + 3 = 7$

$P = 2 \times (\text{length} + \text{width})$

$P = 2 \times (7 + 7) = 2 \times 14 = 28$

The perimeter of the rectangle ABCD is 28 units.

ANSWER IS D

SOLUTION:

Q21: Given that triangles $\widehat{ABC}$ and $\widehat{DEF}$ are congruent ($\widehat{ABC} \cong \widehat{DEF}$), this means all corresponding sides and angles are equal.

Given the congruence:

- $|AB| = |DE|$
- $|AC| = |DF|$

We know that:

$|AB| = 2x - 7 = |DE| = 5$

$|AC| = 9 = |DF| = 3y - 6$

$2x - 7 = 5$

Add 7 to both sides:

$2x = 12$

$x = 6$

$9 = 3y - 6$

Add 6 to both sides:

$15 = 3y$

Divide by 3:

$y = 5$

$x + y = 6 + 5 = 11$

ANSWER IS A

SOLUTION:

Q22: Use the given ratio information

|AE| = 3 × |EC|:

AE = 3 × EC

|BC| = 4 × |CD|:

BC = 4 × CD

Since F and E are points dividing segments AF and AB respectively, and given AF = 3 cm:

We can use the properties of similar triangles or segment division:

AE = 3 × EC, implies AE is a ratio 3:1 on BC's same line.

BC = 4 × CD, therefore:

x + 3 (for BF) = 1/4AB

|FB| = ?

Given the full length is divided in similar triangles proportion:

Using ratio similarity logic:

Thus final x = 6cm

ANSWER IS A

SOLUTION:

Q23: The surface area of a cube is given by the formula:

Surface Area = $6a^2$(for one cube)

When three small cubes are removed, their removal exposes certain faces to the outside.

First Cube Removal: Exposes $2a^2$.

Second Cube Removal: The number of surface areas is the same.

Third Cube Removal: Exposes $4a^2$.

Therefore, the surface area of this cube increased by $6a^2$.

ANSWER IS A

SOLUTION:

Q24: The radius of the wheel is (x + 1)cm, so the circumference C of the wheel is:

$C = 2\pi(x + 1)$

Substitute $\pi = 3$:

$C = 2 \times 3 \times (x + 1) = 6(x + 1)$

The distance from A to B is given as 10(x – 2) cm.

Since the wheel makes one full rotation, the distance it covers (circumference) must equal the distance from A to B:

$6(x + 1) = 10(x – 2)$

Expand and simplify the equation:

$6x + 6 = 10x – 20$

Move all terms involving x to one side and constants to the other:

$6 + 20 = 10x – 6x$

$26 = 4x$

Solve for x:

$x = \frac{26}{4} = 6.5$

Since x must be an integer, the largest integer x can take is:

x = 6

ANSWER IS C

SOLUTION:

Q25: The slope m of line d is $\frac{5}{3}$. This means that for every 3 units of increase in the x-direction, there is an increase of 5 units in the y-direction.

Let's assume:

O is at the origin (0, 0).

A is on the x-axis at (xA, 0).

B is on the line d at (xB, yB).

Given that the slope is $\frac{yB - yA}{xB - xA}$ and A is on the x-axis (yA = 0), we have:

$$\text{slope} = \frac{yB}{xB} = \frac{5}{3}$$

So: $yB = \frac{5}{3} \times B$

The area of triangle AOB can be calculated using:

$$\text{Area} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

The base is $|x - B|$.

The height is $|yB| = \frac{5}{3} \times B$.

Given that the area is 270 cm^2, we set up the equation:

$$\frac{1}{2} \times |xB| \times \frac{5}{3} \times B = 270$$

Simplify:

$$\frac{5}{6} \times B^2 = 270$$

Multiply both sides by 6:

$$5 \times B^2 = 1620$$

Divide by 5:

$$x.B^2 = 324$$

Take the square root:

$xB = \sqrt{324} = 18$

AO is 18 cm.

ANSWER IS D

SOLUTION:

Q26: The slope is given as 75%. The slope percentage is defined as the ratio of the vertical rise to the horizontal run, multiplied by 100.

$$\text{Slope} = \frac{\text{Horizontal Run}}{\text{Vertical Rise}} \times 100$$

Let d be the horizontal distance that İlker has traveled. The vertical rise is given as 600 meters.

Using the slope relationship:

$$\frac{600}{d} = \frac{3}{4}$$

Cross-multiply to find the horizontal distance d:

$600 \times 4 = 3 \times d$

$2400 = 3d$

$d = 800$ meters

ANSWER IS B

SOLUTION:

Q27: First, let's simplify both sides of the equation:

$2.(x - 3) = (2a - 6)x - 8$

Expand both sides:

$2x - 6 = (2a - 6)x - 8$

For the equation to have no solution, the coefficients of x on both sides must be equal, and the constant terms must be different. This comes from the standard form $ax + b = ax + c$, where $b \neq c$.

For the equation $2x - 6 = (2a - 6)x - 8$ to have no solution:

The coefficient of x must be the same on both sides: $2 = 2a - 6$ Solve for a: $2a = 8 \Rightarrow a = 4$

$\sqrt{4} = 2 = a$.

ANSWER IS B

SOLUTION:

Q28: The height of the cylinder is given as 6 cm.

This will be the height of the rectangle.

The diameter of the cylinder is 6 cm, so the radius

r is: $r = \frac{\text{diameter}}{2} = \frac{6}{2} = 3$ cm

The circumference of the base circle (which will be the length of the rectangle when unwrapped) is: Circumference = $2\pi r = 2\times\pi \times 3 = 18$ cm

The rectangle should have a height of 6 cm and a length of 18 cm.

The net should also include two circles with a diameter of 6 cm.

ANSWER IS B

SOLUTION:

Q29: Since the angles $\widehat{ABC}$ and $\widehat{CDE}$ are equal, and $\widehat{ABC}$ is similar to $\widehat{CDE}$, their corresponding sides are proportional.

The corresponding sides are:

$$\frac{|AB|}{|ED|} = \frac{|BC|}{|CD|}$$

Substitute the given values:

$$\frac{15}{20} = \frac{x+2}{8}$$

To solve for x, cross-multiply:

$15 \times 8 = 20 \times (x + 2)$

$120 = 20x + 40$

$80 = 4x$

$x = 20$

ANSWER IS B

SOLUTION:

Q30: The total number of possible outcomes is simply the total number of cards, which is n. The favorable outcomes are the numbers that are multiples of 3 within the range from 1 to n. The multiples of 3 between 1 and n are 3,6,9,… The number of these multiples is given by $\frac{n}{3}$, rounded down to the nearest whole number.

The probability is given as:

$$\frac{\text{Number of favorable outcomes}}{\text{Total number of possible outcomes}} = \frac{1}{4}$$

This becomes:

$$\frac{\left(\frac{n}{3}\right)}{n} = \frac{1}{4}$$

To satisfy this equation, $\frac{n}{3}$ should be close to $\frac{n}{4}$.

Let's solve it algebraically.

$$4\times\left(\frac{n}{3}\right) = n$$

Since $\frac{n}{3}$ is an integer, let's try values of n that are multiples of 3:

For n = 12:

Number of multiples of 3 from 1 to 12 = $\frac{12}{3} = 4$

Total number of outcomes = 12

Probability = $\frac{4}{12} = \frac{1}{3}$ (Not $\frac{1}{4}$)

For n = 20:

Number of multiples of 3 from 1 to 20 = $\frac{20}{3} = 6$

Total number of outcomes = 20

Probability = $\frac{6}{20} = \frac{3}{10}$ (Not $\frac{1}{4}$)

For n = 12:

Number of multiples of 3 from 1 to 12 = $\frac{12}{3} = 4$

Total number of outcomes = 12

Probability = $\frac{4}{12} = \frac{1}{3}$ (Not $\frac{1}{4}$)

The correct match can be determined with smaller values like n = 8:

For n = 8:

Number of multiples of 3 from 1 to 8 = 2\

Total number of outcomes = 8

Probability = $\frac{2}{8} = \frac{1}{4}$

Therefore, the maximum n for which the probability is $\frac{1}{4}$ is 8.

ANSWER IS B

SOLUTION:

Q31: To solve this problem, we'll start by finding the volume of the entire cake, which is in the shape of a cylinder.

The formula for the volume of a cylinder is:

$V = \pi \times r^2 \times h$

Given:

Diameter = 20 cm, so the radius $r = \frac{20}{2} = 10$ cm,

Height h = 20 cm,

$\pi = 3$.

Substituting the values:

$V = 3 \times 10^2 \times 20$

$V = 3 \times 100 \times 20$

$V = 6000\ cm^3$

This is the volume of the entire cake. Since the cake is divided into 8 equal pieces, the volume of one piece is:

Volume of one piece = $\frac{6000\ cm^3}{8} = 750\ cm^3$

ANSWER IS C

SOLUTION:

Q32: The formula for the volume of a cylinder is:

$V = \pi r^2 h$

For the original large cylinder:

- Radius r = 8 cm
- Height h = 20 cm

The volume Vlarge of the original cylinder is:

$Vlarge = \pi \times (8)^2 \times 20 = \pi \times 64 \times 20 = 1280\pi$ cubic cm

The smaller cylinder has:

- A base radius of $\frac{1}{4} \times 8 = 2$ cm (since it's a quarter of the large cylinder's radius)
- The same height h = 20 cm as the large cylinder

The volume Vsmall of the smaller cylinder is:

$Vsmall = \pi \times (2)^2 \times 20 = \pi \times 4 \times 20 = 80\pi$ cubic cm

Now, we need to find how many times the volume of the remaining part of the large cylinder is compared to the volume of the removed part.

The volume of the remaining part Vremaining is:

$Vremaining = Vlarge - Vsmall = 1280\pi - 80\pi$

$= 1200\pi$ cubic cm

Now, find the ratio:

$Ratio = \frac{Vremaining}{Vsmall} = \frac{1200\pi}{80\pi} = 15$

The volume of the remaining part is 15 times greater than the volume of the removed part.

ANSWER IS C

SOLUTION:

Q33: First, let's simplify the given square roots:

$\sqrt{648} = \sqrt{(36 \times 18)} = 6\sqrt{18}$

$\sqrt{18} = \sqrt{(9 \times 2)} = 3\sqrt{2}$

So, the height from the ground to where the blades meet is:

$6 \times 3\sqrt{2} = 18\sqrt{2}$ meters

The closest point of the blades to the ground is when one of the blades is directly pointing downward. The distance from the ground to the closest point of the blade is the height of the meeting point minus the length of the blade:

Closest distance = $18\sqrt{2} - 3\sqrt{2} = 15\sqrt{2}$ meters

ANSWER IS D

SOLUTION:

Q34: For a cube with an edge length of a, the surface area of one face is:

Area of one face = a^2

Since the cube has 6 faces in total, but the top is open, the area of the wood used for the 5 faces is:

Total area = $5 \times a^2$

We know the total area of the wood used is 90 cm^2:

$5a^2 = 90$

Divide both sides by 5:

$a^2 = \frac{90}{5} = 18$

Now, take the square root of both sides:

$a = \sqrt{18}$

ANSWER IS B

SOLUTION:

Q35: First, let's find the radius of the circular light spot on the wall using its area. The formula for the area of a circle is:

Area = $\pi \times r^2$

Given that the area is 432 cm^2 and $\pi = 3$:

$432 = 3 \times r^2$

Solve for r^2:

$r^2 = \frac{432}{3} = 144$

So, the radius r is:

$r = \sqrt{144} = 12$ cm

The problem involves two similar triangles:

The smaller triangle has a base of 10 cm (the diameter of the hole, so its radius is 5 cm) and a height of 5 m (distance from the light source to the obstacle).

The larger triangle has a base of 24 cm (the diameter of the light spot on the wall, so its radius is 12 cm) and an unknown height x (distance from the obstacle to the wall).

Using the property of similar triangles:

$$\frac{\text{Radius of smaller circle}}{\text{Distance from light source to obstacle}} = \frac{\text{Radius of larger circle}}{\text{Total distance from light source to wall}}$$

This gives us:

$$\frac{5 \text{ cm}}{5 \text{ m}} = \frac{12 \text{ cm}}{5 \text{ m} + x}$$

Simplifying:

$$1 = \frac{12}{5 + x}$$

$5 + x = 12$

Cross-multiply to solve for x:

$5 + x = 12$

$x = 12 - 5 = 7$ m