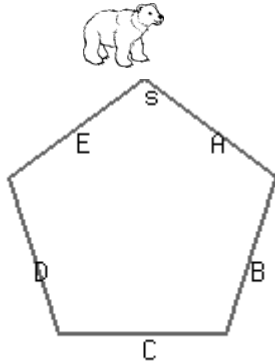


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- (1) A bear is walking on the periphery of a regular polygon, as shown below.

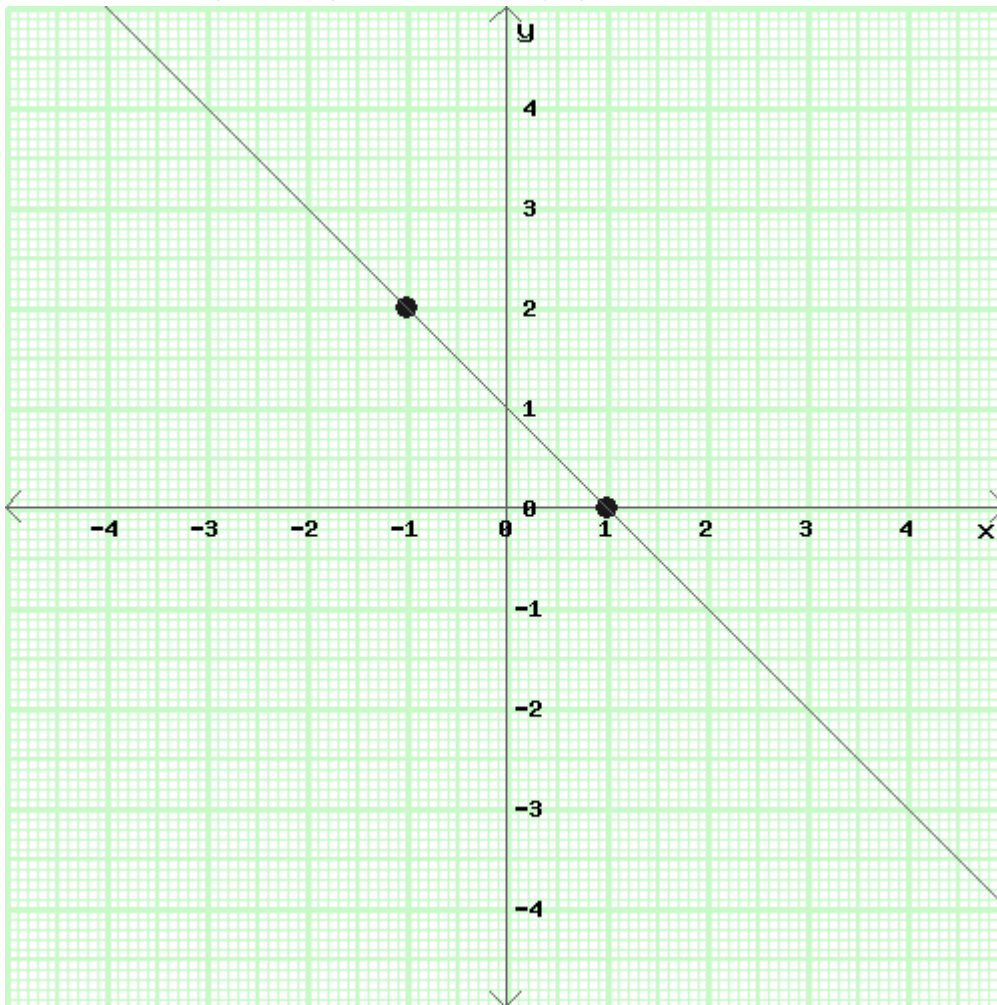


If it starts from point s, in the clockwise direction, which side will the bear reach after walking $\frac{22}{25}$ distance on the periphery?

- a. B b. D
c. A d. E

- (2) The length of a rectangular ground is 9 meters less than 4 times of width. If breadth is b meters, then what is the length?
- (3) A motor boat covers a certain distance downstream in a river in eight hours. It covers the same distance upstream in eight hours and a half. The speed of the water is 1.3 km/hr. The speed of the boat in still water is _____.
- (4) A rectangular screen has a diagonal of 8.2 m. If one side of the screen is 5.32 m, then what is the area of the screen?
 - a. 33.5168 sq. m.
 - b. 33.3168 sq. m.
 - c. 33.1968 sq. m.
 - d. 33.1768 sq. m.
- (5) If the n th term of an arithmetic progression is given by $8 + 5n$, then what is the sum of the first 48 terms of the AP?
- (6) Michael purchased 1000 CDs for his shop at \$20 each. During transportation 100 CDs got damaged, and he sold remaining CDs at the price of \$25 each. Find overall profit/loss in percentage.
- (7) An airline company makes a profit of \$ 1359 on every business class ticket, while loses \$ 151 on every economy class ticket. If the company sold 40194 tickets of economy class, how many business class tickets should it sell to break-even?
- (8) The exterior angle of a triangle is 75° and the ratio of opposite interior angles is 9:6. Find the smaller of the two interior angles.
 - a. 30°
 - b. 35°
 - c. 20°
 - d. 25°

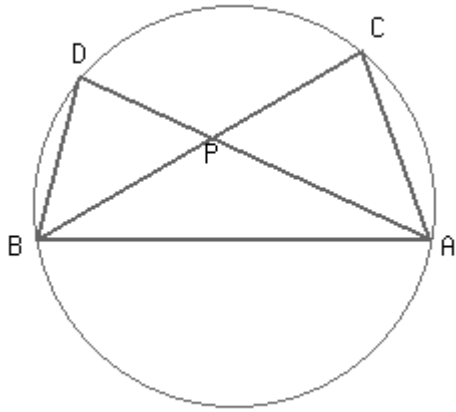
- (9) Find the linear equation represented in the graph below:



- (10) If the diagonal of a square is decreased by 15%, then by what percent does the area of the square decrease?
- (11) In a quadrilateral ABCD, the angles A, B, C and D are in ratio 3:4:5:6. Find the measure of each angle of the quadrilateral.
- (12) The sum of square of two positive numbers is 1280. If square of the larger number is 64 times the smaller number, find the numbers.
- (13) Express the following numbers in the form of $\frac{p}{q}$ and reduce it to the lowest terms.

0.43775

(14) If $\angle DAC = 45^\circ$ and $\angle ADB = 80^\circ$, find angle $\angle APB =$ $^\circ$.



(15) Find the sum of the following integers:
-46327 and -49526



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Answers

(1) d. E

Step 1

If we look at the regular polygon carefully, we notice that there are 5 sides of a regular polygon.

Therefore, the length of a side of the regular polygon = $\frac{1}{5}$

Step 2

Since, the distance walked by the bear on the periphery, in the clockwise direction = $\frac{22}{25}$

Therefore, the number of sides walked by the bear on the regular polygon =

$$\frac{\text{Distance walked by the bear}}{\text{Length of a side of the polygon}}$$

$$= \frac{\frac{22}{25}}{\frac{1}{5}}$$

$$= \frac{22}{25} \times \frac{5}{1}$$

$$= \frac{22}{5}$$

$$= 4.4$$

It means that the bear walked on 4 sides of the regular polygon and the bear is walking on the 5th side of the regular polygon, in the clockwise direction.

Step 3

Since, it started from point *s*, the bear will be on the side *E*, after walking $\frac{22}{25}$ distance on the periphery in the clockwise direction.

Step 4

Hence, option **d** is the correct answer.

(2) $4b - 9$ meters**Step 1**

It is given that the length of a rectangular ground is 9 meters less than 4 times of width. Therefore,
 Length of the rectangular ground = 4 times of width - 9 meters
 = $(4 \times \text{Width of the ground}) - 9$ meters

Step 2

Since, width is given as b , let us replace the width with b ,
 Length = $(4 \times b) - 9$ meters
 Length = $4b - 9$ meters

(3) 42.9**Step 1**

Let the speed of boat in still water be x .
 Since, the speed of water flow is equal to 1.3 km/hr,
 the speed of the boat in downstream = $x + 1.3$,
 and, the speed of boat in upstream motion as $x - 1.3$.

Step 2

If the boat takes 8 hours to travel downstream, the distance it travels will be equal to $8 \times (x + 1.3)$.
 If the time taken to row downstream is 8.5 hours, the distance covered will be $8.5 \times (x - 1.3)$.

Step 3

According to the question, $8(x + 1.3) = 8.5(x - 1.3)$
 $\Rightarrow 8x + 10.4 = 8.5x - 11.05$
 $\Rightarrow 0.5x = 10.4 + 11.05$
 $\Rightarrow x = 42.9$ km/hr.

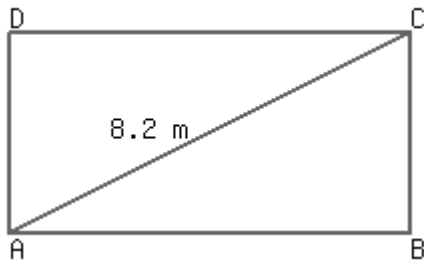
Step 4

Therefore speed of the boat in still water is **42.9 km/hr**.

(4) c. 33.1968 sq. m.

Step 1

Let us assume ABCD as the rectangular screen, as shown below.



According to the question, one side of the screen is 5.32 m. Let us assume the second side of the screen as x m.

In $\triangle ABC$

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

$$\Rightarrow x^2 + 5.32^2 = 8.2^2$$

$$\Rightarrow x^2 = 8.2^2 - 5.32^2$$

$$\Rightarrow x = 6.24$$

Step 2

Now, the area of the screen = 5.32×6.24
 = 33.1968 sq. m.

Step 3

Hence, option **c** is the correct answer.

(5) 6264

Step 1

If d is the difference between consecutive terms, the n^{th} term of arithmetic progression is,

$$T_n = T_1 + (n-1) d$$

Step 2

It is given that,

$$T_n = 8 + 5n$$

$$\Rightarrow T_1 + (n-1) d = 8 + 5n$$

$$\Rightarrow (T_1 - d) + d(n) = 8 + 5n$$

Step 3

On comparing the terms in above equation, we get

$$d = 5 \text{ and}$$

$$(T_1 - d) = 8$$

$$\Rightarrow T_1 = 8 + d$$

$$\Rightarrow T_1 = 8 + 5$$

$$\Rightarrow T_1 = 13$$

Step 4

Now sum of first 48 terms can be calculated using standard formula,

$$S_n = (n/2)[2T_1 + (n-1)d]$$

$$\Rightarrow S_{48} = (48/2)[2(13) + (48-1)(5)]$$

$$\Rightarrow S_{48} = (48/2)(261)$$

$$\Rightarrow S_{48} = 6264$$

(6) 12.5% profit**Step 1**

According to the question, Michael purchased 1000 CDs for his shop at \$20 each.

Cost Price, **CP** = $1000 \times 20 = \$20000$

Step 2

During transportation 100 CDs got damaged.

Remaining CDs = $1000 - 100 = 900$

Step 3

He sold remaining 900 CDs at price of \$25 each.

Selling price, **SP** = $900 \times 25 = \$22500$

Step 4

Profit = $SP - CP$

= $22500 - 20000$

= \$2500

Step 5

$$\text{Profit \%} = \frac{\text{Profit} \times 100}{CP}$$

$$= \frac{2500 \times 100}{20000}$$

$$= \frac{250000}{20000}$$

= 12.5

Step 6

Therefore, there is **12.5% profit**.

(7) 4466

Step 1

Economy class tickets sold by the company = 40194.

Loss on every economy class ticket = \$ 151.

Thus, the loss on 40194 economy class tickets = 40194×151
= \$ 6069294

Step 2

The break-even point is the point at which cost/expenses and revenue are equal, there is no net loss or gain. Therefore, the loss on 40194 economy class tickets is equal to the profit on 4466 business class tickets.

Step 3

Profit on 4466 business class tickets = \$ 6069294

Total profit made by the company on every business class ticket = \$ 1359

Therefore, the number the tickets on which the company makes the profit of \$ 6069294 =

$$\frac{6069294}{1359}$$

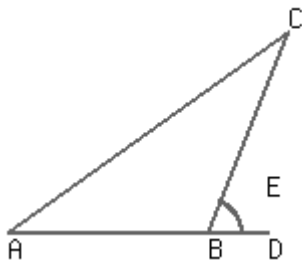
= 4466 tickets

Step 4

Thus, the company should sell **4466** tickets of business class to break-even.

(8) a. 30° **Step 1**

Let us assume $\angle E$ is an exterior angle of the triangle $\triangle ABC$ as shown below.



We know that the exterior angle of a triangle is equal to the sum of the interior opposite angles.

Now, $\angle E = \angle A + \angle C$ -----(1)

Step 2

According to the question, the exterior angles of a triangle is 75° and the interior opposite angles are in the ratio 9:6.

or $\angle A + \angle C = \angle E$

or $\angle A + \angle C = 75^\circ$ -----(1)

and $\angle A : \angle C = 9:6$

$$\text{or } \frac{\angle A}{\angle C} = \frac{9}{6}$$

By cross multiplying both sides,

$$\angle A = \frac{9\angle C}{6} \text{ -----(2)}$$

Step 3

Put the value of $\angle A$ in equation (1):

$$\frac{9\angle C}{6} + \angle C = 75^\circ$$

$$\Rightarrow \frac{9\angle C + 6\angle C}{6} = 75^\circ$$

$$\Rightarrow 15\angle C = 450$$

$$\Rightarrow \angle C = 30^\circ$$

Put the value of $\angle C$ in equation (2):

$$\angle A = 45^\circ$$

Step 4

Therefore, the smaller of the two interior angles is 30° .

(9) $y = -x + 1$

Step 1

The general equation of a line is $y = mx + c$.

So we have to find m and c .

To find c , note from the equation that c is the value of y when $x=0$ (i.e. the equation becomes $y = m \times 0 + c$, or $y=c$).

Step 2

Look at the graph to see if this is a vertical line. If it is not (we'll see the case where it is later in this tip), then what the value of y is when the equation crosses the vertical axis. We see that the value of y at this point is 1. So $c=1$

The next part is finding m

Step 3

The best way to consider m is to think of it as the **slope** of the line.

Think of it as the change in y for a given change in x .

Consider the two equations,

$$y_1 = mx_1 + c, \text{ and}$$

$$y_2 = mx_2 + c$$

Step 4

Now we subtract the first equation from the second.

We get $y_1 - y_2 = mx_1 + c - (mx_2 + c)$

On simplifying,

$$(y_1 - y_2) = m(x_1 - x_2)$$

$$\text{or, } m = \frac{(y_1 - y_2)}{(x_1 - x_2)}$$

Step 5

Now, substitute the two points seen in the graph.

$$m = \frac{0 - (2)}{1 - (-1)}$$

Also, note that this is the reason why we don't apply this when the line is vertical, because the denominator would be 0, and the equation is meaningless.

This is solved to get the value of m , and get the answer $m=-1$

Step 6

Now, if the line is a vertical one, then you can solve it by inspection.

Step 7

So, the answer is $y = -x + 1$.

(10) 27.75%

Step 1

Let the length of the diagonal of the square be d . Length of the side of the square will then be $d / \sqrt{2}$, and the area of the square will be $(d / \sqrt{2}) \times (d / \sqrt{2}) = 0.5d^2$

Step 2

After reducing the length of the diagonal by 15%, the new length of the diagonal will be:

$$= d - \frac{15}{100} d$$

$$= 0.85d$$

Step 3

Hence, the new area will be $0.5(0.85d)^2 = 0.5 \times 0.7225d^2$.

Step 4

Decrease in the area = Old area - New area

$$= 0.5 d^2 - 0.5 \times 0.7225d^2$$

$$= 0.5 \times (1 - 0.7225) d^2$$

$$= 0.5 \times 0.2775 d^2$$

Step 5

Percentage decrease in the area = $\frac{\text{Decrease in the area}}{\text{Old area}} \times 100 \%$

$$= \frac{0.5 \times 0.2775 d^2}{0.5 d^2} \times 100 \%$$

$$= 0.2775 \times 100 \%$$

$$= 27.75\%$$

Step 6

Hence, when the diagonal of the square is decreased by 15%, then the area of the square decreases by **27.75%**.

(11) $\angle A = 60^\circ$, $\angle B = 80^\circ$, $\angle C = 100^\circ$, $\angle D = 120^\circ$

Step 1

Let's assume x is the common factor of the angles of the quadrilateral.

According to the question, the angles A, B, C and D are in ratio 3:4:5:6.

Therefore,

$$\angle A = 3x,$$

$$\angle B = 4x,$$

$$\angle C = 5x \text{ and}$$

$$\angle D = 6x.$$

Step 2

We know that the sum of all interior angles of a quadrilateral is equal to 360° .

$$\text{Therefore, } \angle A + \angle B + \angle C + \angle D = 360^\circ$$

$$\Rightarrow 3x + 4x + 5x + 6x = 360^\circ$$

$$\Rightarrow 18x = 360$$

$$\Rightarrow x = \frac{360}{18}$$

$$\Rightarrow x = 20$$

Step 3

$$\text{Hence, } \angle A = 3x = 3 \times 20 = 60^\circ,$$

$$\angle B = 4x = 4 \times 20 = 80^\circ,$$

$$\angle C = 5x = 5 \times 20 = 100^\circ \text{ and}$$

$$\angle D = 6x = 6 \times 20 = 120^\circ.$$

(12) 32 and 16

Step 1

Let smaller number be x . Therefore square of larger number = $64x$.

Step 2

$$x^2 + 64x = 1280$$

Step 3

$$x^2 + 64x - 1280 = 0$$

Step 4

$$x^2 + 80x - 16x - 1280 = 0$$

Step 5

$$x(x + 80) - 16(x + 80) = 0$$

Step 6

$$(x + 80)(x - 16) = 0$$

Step 7

$x = 16$ or -80 . Since numbers are positive, smaller number $x = 16$.

Step 8

$$\text{Larger number} = \sqrt{64 \times 16} = 32$$

(13) $\frac{10933}{24975}$

Step 1

The general method to solve such problems is to do some mathematical operations that help us remove the repeating part of the decimal.

Step 2

Here, we are given the decimal $0.43\overline{775}$.

Note here that it has a "fixed" part before the recurring digits.

The "fixed" (the initial digits after the decimal that do not recur) is 43, and the recurring digits are 775.

Now let's say $\frac{p}{q} = 0.43\overline{775}$

Step 3

Let's try and get it to a form where only the recurring digits are after the decimal.

Step 4

$$100 \frac{p}{q} = 43.\overline{775}$$

Step 5

Now, we have to remove the recurring part of the decimal.

$$100000 \frac{p}{q} = 43775.\overline{775}$$

Step 6

$$100000 \frac{p}{q} - 100 \frac{p}{q} = 43775.\overline{775} - 43.\overline{775}$$

$$\text{or, } 99900 \frac{p}{q} = 43732$$

Step 7

$$\text{Simplifying, we get } \frac{p}{q} = \frac{10933}{24975} .$$

(14) 125

Step 1

We know that a chord subtends the same angle to points on the circumference of the circle that are on the same side

Here, we know $\angle ADB = \angle ACB$

Also, in triangle APC, $\angle APC + \angle ACP + \angle PAC = 180^\circ$

Step 2

We need to find $\angle DAC$

$$\angle DAC = \angle PAC = \angle APB - \angle ACB = \angle APB - \angle DAC = 45^\circ - 80^\circ = 125^\circ$$

(15) -95853

Step 1

Sum of (-46327) and (-49526) :

$$= -46327 + (-49526)$$

$$= -46327 - 49526$$

$$= -95853$$

Step 2

Hence, the answer is **-95853**.