

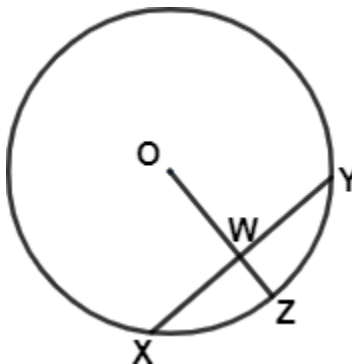
---

# **GMAT - SAMPLE QUESTION PAPER**

---

**Quantitative Reasoning – 31 Questions**

**Question No.1:**



What is the area of the circle shown above with center O?

- I. W is the mid-point of chord XY.
  - II. The ratio of ZW to OW is 3:5
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: E**

**Explanation:**

In the diagram,

OZ is the radius( $r$ ) of the circle and XY is the chord of the circle.

**Rule/Concept:**

Relation between radius and chord:

- *If a radius is perpendicular to a chord, then it bisects the chord.*
- *If a radius bisects a chord (that isn't a diameter), then it's perpendicular to the chord.*

**Question: Area of the circle?**

We need to find the value of the radius( $r$ ), as Area of the circle =  $\pi * r^2$

Actual Question: Value of “ $r$ ” or value of OZ?

**Statement I is insufficient:**

W is the mid-point of chord XY.

Since “W” is the midpoint, we know that, OZ passes through the circle and based on the above rule, OZ is perpendicular to XY.

But still no information on length of chord or radius.

So not sufficient.

Eliminate answer choices A and D. Answers could be either B, C or E.

**Statement II is insufficient:**

The ratio of ZW to OW is 3:5

Length of OZ = length of ZW + length of OW

Let the length of ZW and OW be  $3x$  and  $5x$  respectively, then

We know only length of the radius (OZ) =  $8x$  units.

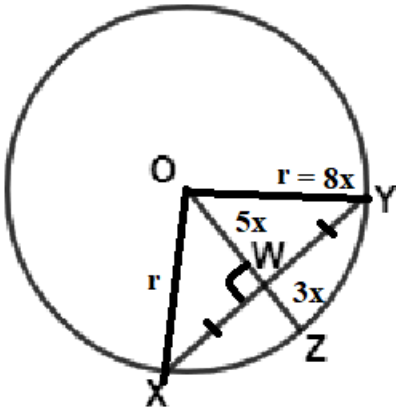
But still, we don't have the exact value of radius, as we know only its ratio.

Radius could be 8, 16... or anything.

So, this is not sufficient. Eliminate answer choice B.

**Together still it is not sufficient.**

As, statement I only talks about the relation between chord and radius. Now along with the statement II, we can find the chord length ratio.



But we need to know the radius length to find the area.

So, together also it is not sufficient.

**Hence the answer is E.**

**Question No.2:**

If  $A^4 + B^4 = 100$ , then the greatest possible value of "A" lies between

- A. 0 and 3
- B. 3 and 6
- C. 6 and 9
- D. 9 and 12
- E. 12 and 15

**Answer: B**

**Explanation:**

**Rule/Concept:**

To maximize one quantity, minimize the other quantities in the expression.

Similarly, to minimize one quantity, maximize the other quantities in the expression.

Here we have to maximize "A" then we should minimize  $B^4$ .

Least value  $B^4$  can take is zero. Because anything raise to an even power cannot be negative. So, least value it could take is zero.

So, if  $A^4 + 0 = 100$

Then,  $A^4 = 100$  and  $A = \sqrt[4]{100}$

OR

$$A = 100^{\frac{1}{4}}$$

Squaring on both sides,

$$A^2 = 100^{\frac{1}{2}} = \sqrt{100}$$

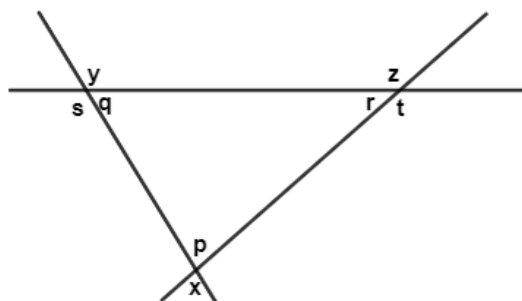
$$A^2 = 10$$

$$\text{So, } A = \sqrt{10} \sim 3.2$$

Hence the answer is between 3 and 6. That is the best fit.

**So, the answer is B.**

**Question No.3:**



In the above figure, if  $y + z = 280^{\circ}$ , what is the degree measure of angle  $x$ ?

- A. 120
- B. 100
- C. 90
- D. 80
- E. 60

**Answer: B**

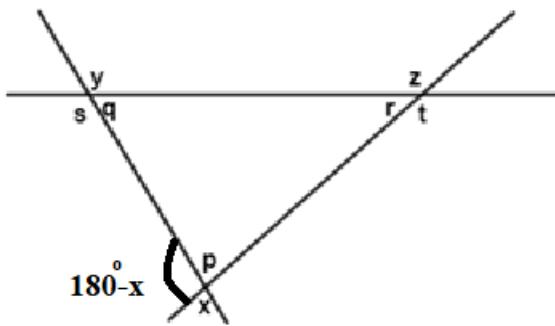
**Explanation:**

We can solve this question in multiple ways, we can use sum of interior angles of a triangle or sum of exterior angles of a triangle. Let's use the later,

**Rule/Concept:**

*Sum of Exterior angles of any  $n$ -sided polygon =  $360^{\circ}$*

Given,  $y + z = 280^{\circ}$



From the above diagram,  $y$ ,  $z$  and  $180^\circ - x$  are the exterior angle of the given triangle.

So, sum of exterior angles,

$$y + z + 180^\circ - x = 360^\circ$$

$$280^\circ + 180^\circ - x = 360^\circ$$

$$x = 100^\circ$$

**Hence the answer is B.**

#### Question No.4:

In a circus company the price of tickets for adult and children were \$50 and \$30 respectively. The company has sold a total of 1000 tickets. The average (arithmetic mean) price per ticket sold was \$42. How many tickets were sold for children?

- A. 200
- B. 300
- C. 400
- D. 600
- E. 800

**Answer: C**

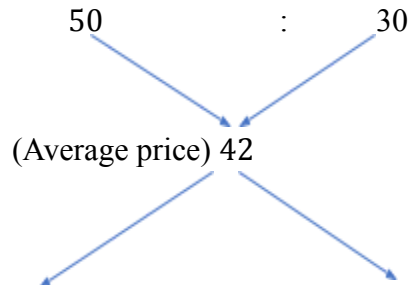
**Explanation:**

**Rule/Concept:**

*Where ever there are two data points mixed and the weighted average(resultant) is given, we can find out in what ratio they are mixed in no time using allegation technique, and importantly without using algebraic methods.*

Let's see, how to solve this using the short-cut Alligation,

Adult ticket price                  Children ticket price



$$|42 - 30| \quad : \quad |50 - 42|$$

$$\frac{\text{No. of Adult ticket}}{\text{No. of Children ticket}} = \frac{|42-30|}{|50-42|} = \frac{12}{8} = \frac{3}{2} = \frac{3x}{2x}$$

Given, total number of tickets sold is 1000.

$$\text{So, } 3x + 2x = 1000.$$

$$x = 200$$

Hence number of children tickets sold were  $2x = 2 * 200 = 400$ .

**Hence the answer is C.**

**Question No.5:**

There are two vessels. In the first vessels, the ratio of milk to water is 1:2 and in the second vessel the milk and water are in the ratio 2:3. In what ratio the contents in two vessels must be mixed such that the resulting mixture will have milk and water in the ratio 5:8?

- A. 1:3
- B. 3:10
- C. 3:5
- D. 10:3
- E. Cannot be determined

**Answer: B**

**Explanation:**

**Rule/Concept:**

Where ever there are two data points mixed and the weighted average(resultant) is given, we can find out in what ratio they are mixed in no time using allegation technique, and importantly without using algebraic methods.

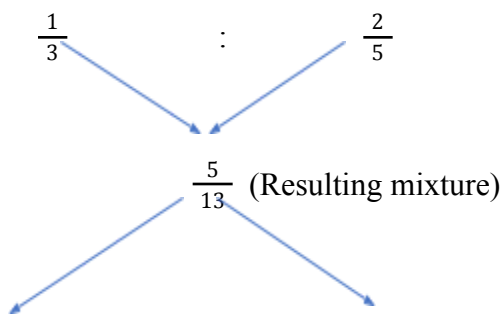
**Let's see, how to solve this using the short-cut Alligation,**

Since they have given ratios, let's find out the proportion of milk in each vessel.

Vessel-1 =  $\frac{\text{milk}}{\text{water}} = \frac{1}{2}$ , milk proportion is  $\frac{1}{(1+2)} = \frac{1}{3}$  and in Vessel-2 =  $\frac{\text{milk}}{\text{water}} = \frac{2}{3}$ , milk proportion is  $\frac{2}{(2+3)} = \frac{2}{5}$  and in Resulting mixture =  $\frac{\text{milk}}{\text{water}} = \frac{5}{8}$ , milk proportion is  $\frac{5}{(5+8)} = \frac{5}{13}$

**First vessel**

**Second vessel**



$$\left| \frac{2}{5} - \frac{5}{13} \right| \quad : \quad \left| \frac{5}{13} - \frac{1}{3} \right|$$

$$\frac{\text{First vessel}}{\text{Second vessel}} = \frac{\left| \frac{2}{5} - \frac{5}{13} \right|}{\left| \frac{5}{13} - \frac{1}{3} \right|} = \frac{\frac{1}{65}}{\frac{2}{39}} = \frac{39}{130} = \frac{3}{10}$$

Hence vessel-1 and vessel-2 should be mixed in the ratio of 3:10

**Hence the answer is B.**

**Question No.6:**

A chemical factory produces two kinds of unnatural amino acids: acid A and acid B. Of the acids produced by the factory last year, 1/3 were acid A and the rest were acid B. If it takes 2/5 as many hours to produce acid B per unit as it does to produce acid A per unit, then the number of hours it took to produce the acid B last year was what fraction of the total number of hours it took to produce all the acids?

A. 2/5



- B. 4/9
- C. 17/35
- D. 1/2
- E. 5/9

**Answer: B**

**Explanation:**

**Rule/Concept:** Fractions in the question - If the question and the answer options have fractions in it, start with a number (product of all the denominators in the question) which is divisible by all the fractions(denominators) in the question.

Let's make a table here, as there are two entities,

	Number of units	Time (in hours)	Total time taken
Acid A			
Acid B			
Total			

Let the total number of units be 90(we can choose any value which is divisible by the denominators).

$$\text{Acid A, number of units} = \frac{1}{3} * 90 = 30$$

Let the number of hours taken to produce, acid A, per unit = 5

$$\text{Then, the number of hours taken to product, acid B, per unit} = \frac{2}{5} * 5 = 2$$

Total time taken = Number of units \* No. of hours taken per unit.

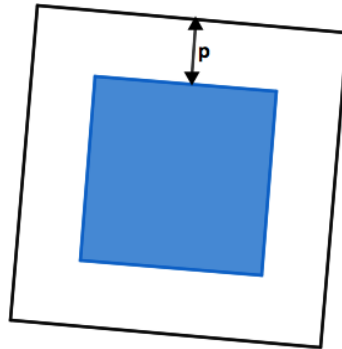
Now, let's fill the table.

	Number of units	Time (in hours)	Total time taken
Acid A	30	5	30*5 = 150
Acid B	60	2	60*2 = <b>120</b>
Total	90		<b>270</b>

**Question:** The number of hours it took to produce the acid B last year is fraction of the total number of hours it took to produce all the acids?

$$\frac{\text{Total hours of B}}{\text{Total hours}} = \frac{120}{270} = \frac{4}{9}$$

**Hence the answer is B.**

**Question No.7:**

The figure above represents a picture set in a square wooden frame that is “p” inches wide on all sides. If the combined area of picture and the frame is equal to “q” square inches, then in terms of p and q, what is the perimeter of the picture?

- A.  $-8p + 4q$
- B.  $2p + 2q$
- C.  $(-2p + \sqrt{q})^2$
- D.  $4(\sqrt{q} - p)$
- E.  $4\sqrt{q} - 8p$

**Answer: E**

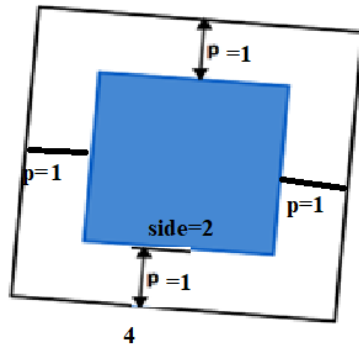
**Explanation:**

**Strategy:** Variables in the answer choices or questions, start plug in your own value for the variables given in the question. Convert the variable(algebra) question to the numbers(arithmetic) question by substituting the values for the variables.

Let's take  $p = 1$  and  $q = 16$

If the Area of the entire wooden frame is 16 square inches, then the side will be 4 inches.

Area of a square =  $side^2$ . Hence side of a square =  $\sqrt{Area}$



So, the side of the picture will be 2 inches (total length 4 and frame is one inch wide in all sides, hence  $4 - 2 = 2$ )

Perimeter of the picture =  $4 * side = 4 * 2 = 8$  inches.

Substitute  $p = 1$  and  $q = 16$  and check which answer choice matches with 8 inches.

- A.  $-8p + 4q = 56$ . This doesn't match. So, eliminate.
- B.  $2p + 2q = 34$ . This doesn't match. So, eliminate.
- C.  $(-2p + \sqrt{q})^2 = 4$ . This doesn't match. So, eliminate.
- D.  $4(\sqrt{q} - p) = 12$ . This doesn't match. So, eliminate.
- E.  $4\sqrt{q} - 8p = 8$ . This match. So, hold on.

**Hence the answer is E.**

OR

Alternatively, we can solve this with direct equation method.

Since the area of the entire shape (big square) is " $q$ " square inches.

Side of the entire shape is  $\sqrt{q}$

Now side of the picture (small square) is at " $p$ " inches wide from all sides.

So, if we take any side of the big square, it is " $p$ " inches apart from either side of the small square.

So, side of the picture (small square) is  $\sqrt{q} - 2p$

Perimeter of the square picture =  $4 * side = 4(\sqrt{q} - 2p) = 4\sqrt{q} - 8p$

**Hence the answer is E.**

**Question No.8:**

Is parallelogram PQRS a rhombus?

- I.  $PQ=QR=RS=SP$
  - II. The line segments SQ and RP are perpendicular bisectors of each other.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: D**

**Explanation:**

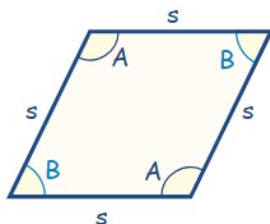
Question: Is parallelogram PQRS a rhombus?

It is given that,

PQRS is a parallelogram, so PQRS will have the following properties,

- Opposite sides of PQRS are equal in length.
- Opposite angles of PQRS are equal in measure.
- The diagonals of PQRS bisect each other.
- Consecutive(adjacent) angles are supplementary, add to  $180^\circ$ .

*Let's understand when a parallelogram becomes a rhombus.*



**Rule/Concept:**

A parallelogram whose,

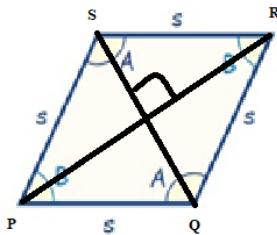
1. All four sides are equal.
2. The diagonals of a rhombus always bisect each other at  $90^\circ$ .
3. The diagonals bisect the vertex angles (Interior angles).

So, If PQRS has anyone of the above the properties then it is a rhombus.

**Statement I is sufficient:**

$$PQ=QR=RS=SP$$

All four sides are equal. According to the first property it is a Rhombus.



So, PQRS is a Rhombus.

Sufficient. Eliminate answer choices B, C and E. Answers are either A or D.

**Statement II is sufficient:**

The line segments SQ and RP are perpendicular bisectors of each other.

The diagonals of a rhombus always bisect each other at  $90^\circ$ . According to the second property it is a rhombus again.

So, it is sufficient.

**Hence the answer is D.**

**Question No.9:**

If  $y - x > x + y$ , where “x” and “y” are integers, which of the following must be true?

- I.  $x < 0$
- II.  $y > 0$
- III.  $xy > 0$

A. I only

- B. II only
- C. I and II only
  
- D. I and III only
- E. II and III only.

**Answer: A**

**Explanation:**

First thing to note, “must-be” means “ALWAYS” true.

This is a special Problem-solving question, where you need to analyze the statements and check whether they are true or not and choose the answer choices accordingly.

Given,  $y - x > x + y$ .

Let's use the properties of inequalities to simplify this. Add “ $x$ ” on both sides.

$$x + y - x > x + x + y$$

$$y > 2x + y \quad \text{Add “} - y \text{” on both sides.}$$

$$y - y > 2x + y - y$$

$$0 > 2x$$

So,  $x < 0$ . **Hence statement I is always true.** Eliminate answer choices B and E.

**II.  $y > 0$ . This is not necessarily always true.**

For example, if  $x = -2$  and  $y = -3$

$$y - x > x + y \rightarrow -3 - (-2) > -2 + -3 \rightarrow -1 > -5. \text{ So, “} y \text{” can be negative too.}$$

Eliminate answer choice C.

**III.  $xy > 0$ . Again, this is not necessarily always true.**

For example, if  $x = -2$  and  $y = 3$

$$y - x > x + y \rightarrow 3 - (-2) > -2 + 3 \rightarrow 5 > 1. \text{ So, “} xy = -6 \text{” can be negative too.}$$

Eliminate answer choice D.

**Hence the answer is A.**

**Question No.10:**

If  $p < x < q$  and  $r < y < s$ , is  $x > y$ ?

- I.  $p < r$
- II.  $q < r$

- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: B**

**Explanation:**

Given,  $p < x < q$  and  $r < y < s$ .

**Question: Is  $x > y$ ?**

**Statement I is insufficient:**

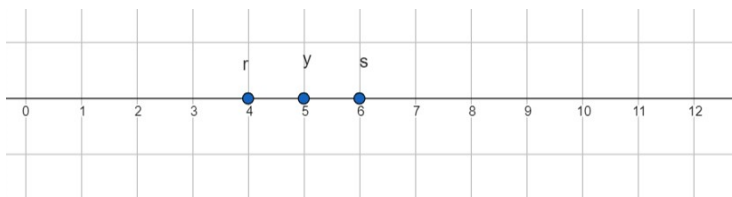
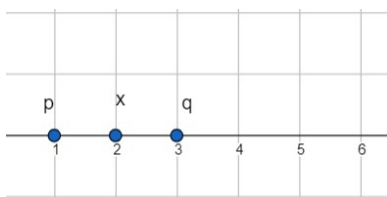
$$p < r$$

We can plug some values and we can see that; it is not sufficient.

For example,

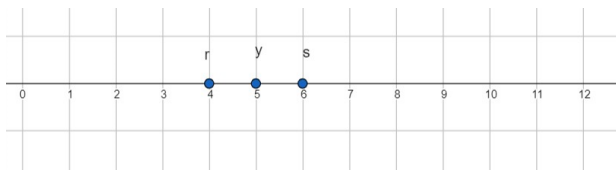
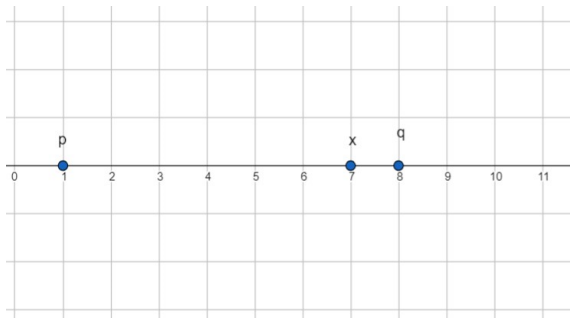
$$\text{If } p < x < q = 1 < 2 < 3 \text{ and } r < y < s = 4 < 5 < 6$$

Here  $p < r$  that is  $1 < 4$  but answer to the question, is  $x > y$  2 is less than 5. So, the answer is NO to the question.



But if,

If  $p < x < q = 1 < 7 < 8$  and  $4 < y < s = 4 < 5 < 6$



Here  $p < r$  that is  $1 < 4$  but answer to the question, is  $x > y$  7 is greater than 5. So, the answer is YES to the question.

Both YES and NO answer. So, it is not sufficient. Eliminate answer choice A and D.

Answers could be B, C and E.

**Statement II is sufficient:**

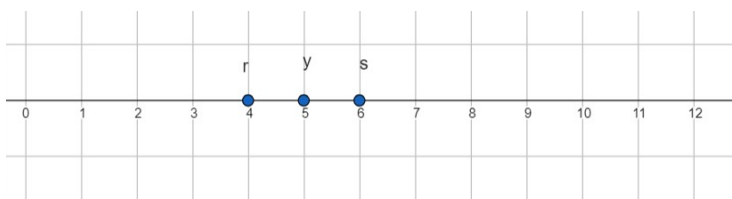
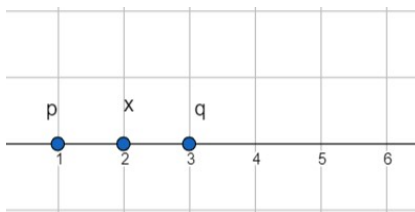
$q < r$

We can plug some values and we can see that; it is not sufficient.

For example,

If  $p < x < q = 1 < 2 < 3$  and  $r < y < s = 4 < 5 < 6$

Here  $p < r$  that is  $1 < 4$  but answer to the question, is  $x > y$  2 is less than 5. So, the answer is NO to the question.





But since  $q < r$ , always we will have  $x < y$ , because “q” is always to the left of “r”

$$p < x < q < r < y < s$$

So,  $x < y$ .

**Hence the answer is B.**

**Question No.11:**

A book shop sold a set of Harry Potter book series to a book collector for 40 percent more than the store had originally paid for the books. When the collector tried to resell the books to the store, the store bought it back at 50 percent of what the book collector had paid. The shop then sold the book again at a profit of 70 percent on its buy-back price. If the difference between the series of book's original cost to the shop and the book's buy-back price was \$100, for approximately how much did the shop sell the books the second time?

- A. 600
- B. 567
- C. 396
- D. 333
- E. 330

**Answer: C**

**Explanation:**

Book shop original cost price = “x”

It sold to the book collector at a 40% profit,

So, selling price for the book shop =  $x + 40\% \text{ of } x = 1.4x$

Where the cost price for the collector =  $1.4x$

Book collector sold it at 50 percent of the price =  $\frac{1}{2} * 1.4x = 0.7x$

So, the buy back price for the shop =  $0.7x$

Shop sold it again at a price of 70 percent profit on its buy back price.

So, it sold it second time for =  $0.7x + 70\% \text{ of } 0.7x = 1.19x$

Let's draw a table as there are series of events.

	Cost price	Selling price -1	Selling price-2
Book Shop	X	1.4x	$1.7 * 0.7x = 1.19x$
Book collector	1.4x	0.7x	

**Question:** How much did the shop sold for second time? i.e.,  $1.19x$ ?

Given that, the difference between the series of book's original cost to the shop and the book's buy-back price = \$100

$$\text{i.e., } x - 0.7x = 100$$

$$x \sim 333.33$$

$$\text{So, } 1.19x = 1.19 * 333.33 \approx 396$$

**Hence the answer is C.**

**Question No.12:**

By what percent was the price of a certain Tab discounted for a sale?

- I. The price of the tab was sold with a discount of \$50.
  - II. The price of the tab before it was discounted for the sale was 25 percent greater than the discounted price.
- 
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: B**

**Explanation:**

**Question: Discount percent?**

**Rule/Concept:**  $\text{Marked Price} - \text{Discount} = \text{Selling price}$

$$\text{Discount \%} = \frac{\text{Discount}}{\text{Marked price}} * 100$$

**Statement I is insufficient:**

The price of the tab was sold with a discount of \$50.

We don't the marked price (that is the price before discount), we cannot find the discount percentage.

So, it is not sufficient. Eliminate answer choices A and D.

**Statement II is sufficient:**

The price of the tab before it was discounted for the sale was 25 percent greater than the discounted price.

Here the discounted price means the price which is sold for,

marked price (that is the price before discount) = selling price + 25% of the selling price.

If selling price be "x", then

$$\text{Marked price} = x + 25\% \text{ of } x = 1.25x$$

$$\text{Discount} = \text{marked price} - \text{selling price} = 1.25x - x$$

$$\text{Discount \%} = \frac{\text{Discount}}{\text{Marked price}} * 100$$

$$= \frac{0.25x}{1.25x} * 100$$

$$= 20\%$$

**Hence the answer is B.**

**OR**

Alternatively,

In percentage questions, you can assume some price to be 100 and then do your calculations and get your answer in percentage terms. The reason for this is that it doesn't matter what the price actually is. The percentage will remain the same.

e.g.

Discounted price (selling price) is 100. When we increase it by 25%, we get 125 as the price before discount (marked price).

$$\text{Discount given} = \frac{125-100}{125} = 20\%$$

**Hence the answer is B.**

**Question No.13:**

The colored roses in the bouquet of flowers are red, yellow and pink. The ratio of the number of red to the number of yellow to the number of Pink in the bouquet is 7:4:6, respectively. If there are more than 7 yellow-colored roses, what is the minimum number of total roses in the bouquet?

- A. 8
- B. 12
- C. 14
- D. 24
- E. 34

**Answer: E**

**Explanation:**

Given that,

Ratio of *Red : Yellow : Pink* = 7 : 4 : 6

Let the number of red, yellow and pink be,

$7x : 4x : 6x$

So, total number of roses =  $7x + 4x + 6x = 17x$

So, the total number of roses are multiple of 17.

Hence eliminate A, B, C and D.

So, the answer is E.

Also, given that, number of yellow-colored roses is more than 7

That is,  $4x > 7$

So,  $x > 1$

But the question has asked for the minimum number of colors, hence “x” has to be minimum 2.

So, total number of roses =  $17x = 17 * 2 = 34$

**Hence the answer is E.**

**Question No.14:**

If Polygon A has fewer than 10 sides and the sum of the interior angles of polygon A is divisible by 16, how many sides does Polygon A have?

- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

**Answer: C**

**Explanation:**

**Rule/Concept:** *Sum of interior angles of Polygon* =  $(n - 2) * 180^0$

Where “n” is the number of sides.

Given that,

Polygon A, has  $n < 10$

Also,  $(n - 2) * 180 = 16k$

Simplifying it we get,

$$(n - 2) * 45 = 4k$$

Since, LHS in the above equation is a multiple of 4.

But 45 is not a multiple of 4, hence (n-2) has to be a multiple of 4.

$$n - 2 = 4q$$

$$n = 4q + 2$$

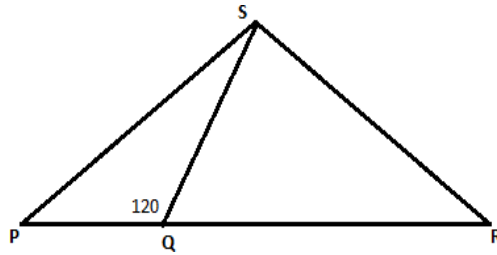
Hence “n” can be 6, 10, 14 etc

But given that,  $n < 10$

So, the number of sides is 6.

**Hence the answer is C.**

**Question No.15:**



In the figure above PRS is a triangle, what is the measure of the angle PSQ?

- I.  $QS=QR=1$
  - II.  $PR=2$
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: C**

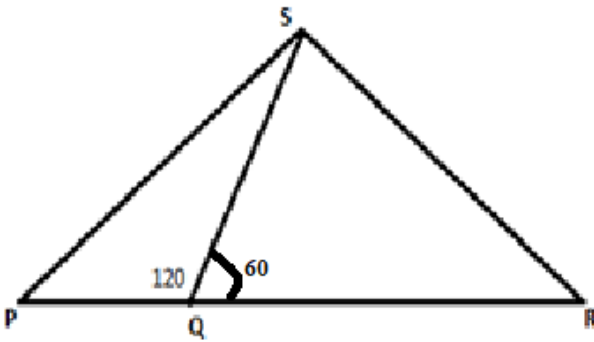
**Explanation:**

Given, PRS is a triangle,

Since PQR is a line segment,  $\angle PQS + \angle SQR = 180^{\circ}$

$$\angle PQS = 120^{\circ}$$

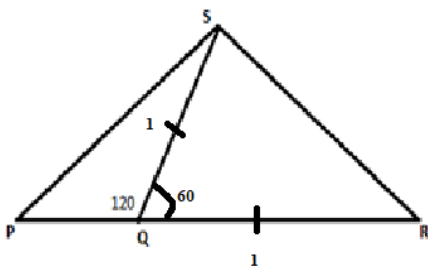
$$\text{So, } \angle SQR = 60^{\circ}$$



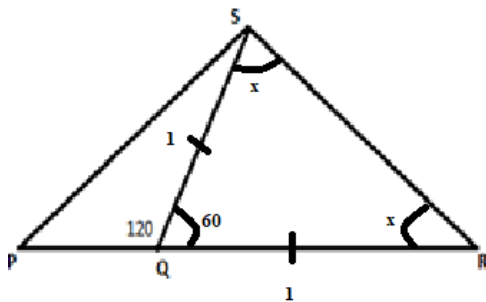
Question:  $\angle PSQ$ ?

**Statement I is insufficient:**

$QS=QR=1$



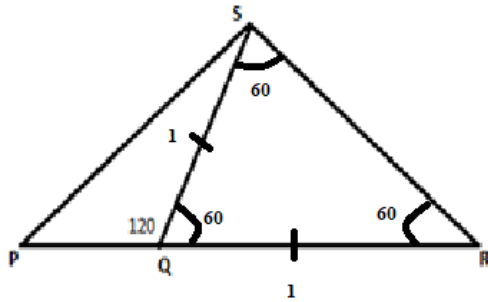
Given, two sides of triangle QRS is equal, if two sides are equal then corresponding opposite two angles are also equal.



Now the angles of QRS =  $60 + x + x = 180$

So,  $x = 60^{\circ}$ .

Hence it is an equilateral triangle with all three sides are equal



But we still don't know the angle of  $\angle PSQ$

We only know that,  $\angle PSQ + \angle SPQ = 60^\circ$ .

So, not sufficient. Eliminate answer choices A and D.

**Statement II is insufficient:**

$PR = 2$

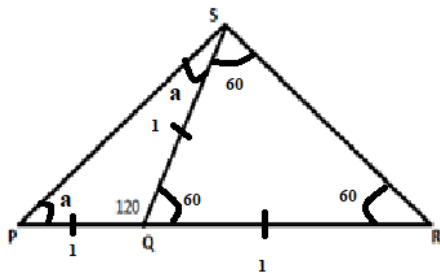
We only know the length of PR (one side of the triangle PRS); we don't know other angle or the side length.

**Together it is sufficient:**

We know that  $PR = 2$

$PQ + QR = 2$

If  $QR = 1$  then,  $PQ = 1$



Now, triangle PQS is an isosceles triangle. If two sides are equal then corresponding opposite two angles are also equal.

Now the angles of PQS =  $120 + a + a = 180$

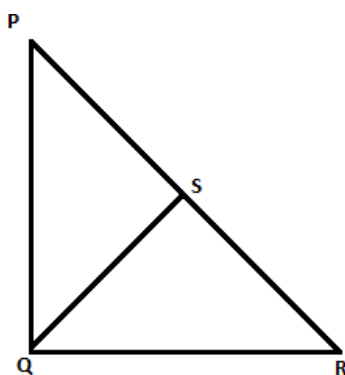
So,  $a = 30$

Hence the  $\angle PSQ = 30^\circ$ . Together it is sufficient.

**So, the answer is C.**



**Question No.16:**



In the diagram above, triangle PQR has a right angle at Q. If  $PQ > QR$ , then what is the ratio of the area of triangle PQS to the area of triangle RQS?

- I. Line segment QS is perpendicular to PR and has a length of 12.
  - II. PQR has a perimeter of 60.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: C**

**Explanation:**

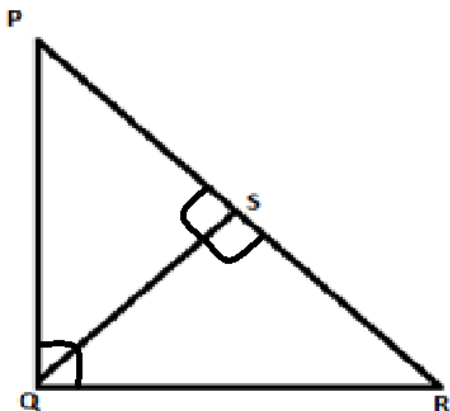
Given that, PQR is a right triangle and angle PQR is  $90^{\circ}$

**Question:**  $\frac{\text{Area of triangle PQS}}{\text{Area of triangle RQS}}$  ?

**Statement I is insufficient:**

Line segment QS is perpendicular to PR and has a length of 12.

**Rule/Concept:** A line perpendicular to the hypotenuse will always divide the triangle into two triangles with the same properties as the original triangle.



So, PQS and RQS are similar. In two similar triangles, the ratio of their areas is the square of the ratio of their sides

$$\frac{\text{Area of triangle PQS}}{\text{Area of triangle RQS}} = \frac{(\text{side of triangle PQS})^2}{(\text{corresponding side of triangle RQS})^2}$$

We don't know any other side length or the angles.

We only that, PQS is similar to RQS, so their sides are proportional.

But we don't know the side lengths.

So, it is not sufficient. Eliminate answer choices A and D.

**Statement II is insufficient:**

PQR has a perimeter of 60.

$$\text{Sum of the sides, } PQ + QR + PR = 60$$

We know the perimeter, but again no information about whether QS is perpendicular to PR.

So, not sufficient. Eliminate the answer choice B.

**Together it is sufficient.**

Let the lengths of PQ = a, QR = b and PR = c respectively.

Given from statement II,

$$a + b + c = 60$$

Let's equate the areas:

Area of triangle PQR,

$$\frac{1}{2} * a * b = \frac{1}{2} * QS * c$$

Because area is  $\frac{1}{2} * \text{base} * \text{height}$

Since  $QS = 12$ , from statement I, we get

$$\frac{1}{2} * a * b = \frac{1}{2} * 12 * c$$

$$a * b = 12 * c$$

Also, using Pythagoras theorem,

$$a^2 + b^2 = c^2$$

So, we have three equations and three variables, so we can solve it and it is sufficient. It is a DS question; we just need to justify whether the statements will give a unique value or not.

We can stop here and chose the answer as “C”. But for more clarity let me explain how to find the values of a, b and c.

$$1. a + b + c = 60$$

$$2. ab = 12c$$

$$3. a^2 + b^2 = c^2$$

Using algebraic expression,  $a^2 + b^2 = (a + b)^2 - 2ab$

Let's replace this in the equation 3.

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

$$\text{From (1) } a + b = 60 - c$$

$$(60 - c)^2 - 2ab = c^2$$

$$\text{From (2) } ab = 12c$$

$$(60 - c)^2 - 2(12c) = c^2$$

Solving the quadratic equation, we get  $c = 25$

So, equation (1) will be  $a + b = 35$  and equation (2) will be  $ab = 300$

Again, solving for “a” and “b” we get  $a = 20$  and  $b = 15$

$$\frac{\text{Area of triangle PQS}}{\text{Area of triangle RQS}} = \frac{(\text{side of triangle PQS})^2}{(\text{corresponding side of triangle RQS})^2}$$

So, sides are in the ratio of  $\frac{a}{b} = \frac{20}{15} = \frac{4}{3}$

So, area will be in the ratio of  $\frac{16}{9}$

Together it is sufficient.

It is a DS question, we need find actual values, all we need to know is whether the statements sufficient or not. **Hence the answer is C.**

**Question No.17:**

In a certain show, a lottery ticket is numbered consecutively from 100 through 999(both inclusive). What is the probability that a randomly selected ticket will have a number with a ten's digit as "3"?

- A. 1/5
- B. 90/899
- C. 1/10
- D. 1/11
- E. 10/111

**Answer: C**

**Explanation:**

The number of integers from 100 through 999(both inclusive) = 900

Three-digit number with a ten's digit as 3.

So, your number be

H3U

Let find out the different digits for hundred's and unit's place

\_\_\_\_\_ 9 \_\_\_\_\_ \* \_\_\_\_\_ 1 \_\_\_\_\_ \* \_\_\_\_\_ 10 \_\_\_\_\_

Hundred's place(H)    Ten's place    Unit's place(U)

9 different ways to choose hundred's place as "0" cannot be in hundred's place

10 different ways to choose unit's place as "0" can be in the unit's place.

Number of different ways for ten's being the unit's place =  $9 * 1 * 10 = 90$

$$\text{Probability} = \frac{\text{Number of tickets with ten's digit as 3}}{\text{total numebr of tickets}} = \frac{90}{900} = \frac{1}{10}$$

**Hence the answer is C.**

**Question No.18:**

In a certain linguistics school, there are totally 250 students. Of those 250 students, 40 percent study French as a foreign language, 30 percent study German as a foreign language and 50 percent study Spanish as a foreign language. If 10 students study all these three foreign languages and 10 students didn't choose these three foreign languages, then how many students are studying in exactly two of these foreign languages?

- A. 20
- B. 30
- C. 40
- D. 50
- E. 60

**Answer: B****Explanation:**

**Rule/Concept:** For a 3-set overlapping questions, it is better to use Venn-diagram or Inflated total formula. If a question specifically uses words, "exactly", "only" or "atmost", then better to use the Inflated total formula.

Inflated total = Exactly one (I) + 2 \* Exactly two (II) + 3 \* Exactly three (III)

Given, Actual total = 250 students

So, actual total = Exactly one (I) + Exactly two (II) + Exactly three (III) = 250

French = 40% of 250 = 100, German = 30% of 250 = 75 and Spanish = 50% of 250 = 125

All three = Exactly three (III) = 10

Neither of these three languages = 10

So, inflated total = Exactly one (I) + 2 \* Exactly two (II) + 3 \* Exactly three (III) = 300

**Question:** Exactly two (II)?

Actual total (At least one) = I + II + III = 250 -----(1)

Inflated total = I + 2II + 3III = 300----- (2)

Solving (2)-(1) we get,

$$II + 2 * III = 50$$

$$II + 2 * 10 = 50$$

$$II = 30$$

30 students have chosen exactly two languages.

**So, the answer is B.**

**Question No.19:**

The interior of a rectangular box is designed by a certain manufacturer to have a volume of “m” cubic feet and ratio of length to width to height of 5:3:2. In term of “m”, which of the following equals the length of the box in feet?

A.  $\sqrt[3]{\frac{25m}{6}}$

B.  $\frac{25}{6}\sqrt[3]{m}$

C.  $\sqrt[3]{\frac{9m}{10}}$

D.  $\sqrt[3]{\frac{4m}{15}}$

E.  $\sqrt[3]{m}$

**Answer: A**

**Explanation:**

**Strategy:** Variables in the answer choices or questions, start plug in your own value for the variables given in the question. Convert the variable(algebra) question to the numbers(arithmetic) question by substituting the values for the variables.

Given ratio of *length : width : height* = 5: 3: 2

Let's take length = 10, width = 6 and height = 4(as they are in the ratio of 5:3:2)

The volume of the rectangular box

$$\text{length} * \text{width} * \text{height} = 10 * 6 * 4 = 240 \text{ cubic feet}$$

So, given  $m = \text{Volume of the box}$

So,  $m = 240$  cubic feet. Length of the box = 10 feet

Substitute  $m = 240$  and check which answer choice matches with 10 feet.

A.  $\sqrt[3]{\frac{25m}{6}}$  10. This match. So, hold on.

B.  $\frac{25}{6}\sqrt[3]{m}$  Not an integer. This doesn't match. So, eliminate.

C.  $\sqrt[3]{\frac{9m}{10}}$  6. This doesn't match. So, eliminate.

D.  $\sqrt[3]{\frac{4m}{15}}$  4. This doesn't match. So, eliminate.

E.  $\sqrt[3]{m}$  Not an integer. This doesn't match. So, eliminate.

Hence the answer is A.

OR

Alternatively, we can solve this with direct equation method.

Given, the volume of the box is “m” cubic feet.

Given ratio of *length : width : height* = 5: 3: 2

Let the *length : width : height* = 5a: 3a: 2a

Volume of the box = 5a \* 3a \* 2a = 30a<sup>3</sup>

$$30a^3 = m$$

$$a = \sqrt[3]{\frac{m}{30}}$$

$$\text{Length} = 5a = 5 * \sqrt[3]{\frac{m}{30}} = \sqrt[3]{\frac{125m}{30}} = \sqrt[3]{\frac{25m}{6}}$$

Hence the answer is A.

**Question No.20:**

Lines “l” and “k” are perpendicular to each other. And line “l” passes through points (4,1) and (8, -1). What is the equation of the line “k” which passes through the point (3,1)?

- A.  $2y - x = 5$
- B.  $2x - y = 5$
- C.  $y - 2x = 5$
- D.  $y + 2x = 5$
- E.  $2y + x = 5$

**Answer: B**

**Explanation:**

**Rule/Concept:** *If two lines are perpendicular to each other then their product of their slopes is -1.*

Given,

Line “l” passes through the points (4,1) and (8, -1)

Let’s find the slope of line “l”

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 1}{8 - 4} = -\frac{1}{2}$$

Slope of line l \* slope of line k = -1

$$-\frac{1}{2} * \text{slope of line k} = -1$$

So, slope of line "k" = 2

Equation of a line when slope and a point is given,

$$y - y_1 = m(x - x_1)$$

Line "k" passes through the point (3,1) and slope is 2.

So,

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

$$y = 2x - 6 + 1$$

$$y = 2x - 5$$

**Hence the answer is B.**

**Question No.21:**

A certain cafeteria sells donuts and pizzas. Is the number of people who bought donuts are more than the number of people who bought pizzas?

- I. Of the people who bought donuts, 30 percent of them also bought pizzas.
  - II. Of the people who bought pizzas, 40 percent of them also bought donuts.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: C**

**Explanation:**

**Question: Number of people who bought donuts > Number of people who bought pizzas?**

**Statement I is insufficient:**

Of the people who bought donuts, 30 percent of them also bought pizzas.



Let “D” be the number of people who bought donuts.

Then, Both = 0.3D.

Not sufficient. As the number of people who bought pizzas were not given.

Eliminate answers choices A and D.

**Statement II is insufficient:**

Of the people who bought pizzas, 40 percent of them also bought donuts.

Let “P” be the number of people who bought donuts.

Then, Both = 0.4P.

Again, not sufficient. As the number of people who bought pizzas were not given.

Eliminate answers choice B.

**Together it is sufficient.**

We can draw a table for 2-sets questions.

	Pizzas	No Pizzas	Total
Donuts	$0.4P = 0.3D$		D
No donuts			
Total	P		

$$0.4P = 0.3D$$

$$\frac{P}{D} = \frac{3}{4}$$

So, number of people who bought donuts were more than the number of people who bought pizzas.

**Hence the answer is C.**

**Question No.22:**

Alan purchased pens and pencils at a certain shop, where each pen costs 3 dollars and each pencil cost 2 dollars. What is the total number of pen and pencils Alan purchased?

- I. Alan bought pen and pencils for the total cost of 10 dollars.
  - II. Total cost of the pens which Allan bought is less than 10 dollars.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.

- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: A**

**Explanation:**

**Rule/Concept:** Diophantine equation – Solving only for the integer solution.

Let “p” be the number of pens and “q” be the number of pencils.

p and q can only be positive integers.

Cost of each pen = 3 dollars.

So, total cost of pen =  $3p$

Cost of each pencil = 2 dollars.

So, total cost of pencil =  $2q$

**Question: Value of “ $p + q$ ”**

**Statement I is sufficient:**

Alan bought pen and pencils for the total cost of 10 dollars.

So, according to the above information,

$$3p + 2q = 10$$

We could only one solution for “p” and “q” as they are greater than 0.

We all know, that either

$$\text{EVEN} + \text{EVEN} = \text{EVEN}$$

Or

$$\text{ODD} + \text{ODD} = \text{EVEN}$$

Later is not possible since, “ $2q$ ” is even.

So,  $\text{EVEN} + \text{EVEN} = \text{EVEN}$  is the only possible case.

So, “ $3p$ ” has to be even, hence “p” is even.

“p” can take only one possible even number in this equation which is “2” if “p=4” then the total cost of pencils become 12 dollars which exceeds the total amount.

So,  $p = 2$  and  $q = 2$

Hence,  $p + q = 4$

So sufficient.

Eliminate answer choices B, C and E. Hence the answers are A or D.

**Statement II is insufficient:**

Total cost of the pens which Allan bought is less than 10 dollars.

No sufficient.

$$3p < 10$$

$$p < 3.333$$

So, number of pens is less than or equal to 3

If he has bought one pen and two pencils, then the total cost is  $3(1) + 2(2) = 7$

Then,  $p + q = 3$

If he has bought two pen and two pencils, then the total cost is  $3(2) + 2(2) = 10$

Then,  $p + q = 4$

No information about “q”. So, not sufficient. Eliminate D.

**Hence the answer is A.**

### Question No.23:

Water is pumped into the completely empty tank at a constant rate through an inlet pipe. At the same time, there is a leak at the bottom of the tank which leaks water at a constant rate. How long it will take the tank get filled completely?

- I. Total capacity of water the tank can hold is 120 gallons.
  - II. Inlet pipe can completely fill the empty tank in 10 hours if there is no leak in the tank, and also the leak at the bottom of the tank can completely empty the filled tank in 15 hours if there is no water pumped into the tank.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.

- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: B**

**Explanation:**

Given, there is an inlet pipe which the fill the tank and there is a leak at the bottom of the tank.

**Question: How long it takes to fill the empty tank?**

**Statement I is insufficient:**

Total capacity of water the tank can hold is 120 gallons.

Not sufficient.

Rate of both the inlet or outlet is not given.

So, insufficient. Eliminate answer choices A and D.

**Statement II is sufficient:**

Inlet pipe can completely fill the empty tank in 10 hours if there is no leak in the tank, and also the leak at the bottom of the tank can completely empty the filled tank in 15 hours if there is no water pumped into the tank.

We know that, rate and time are inversely proportional.

Given, time taken by the inlet pipe is 10 hours. So, rate of the inlet pipe is  $\frac{1}{10}$

Given, time taken by the leak is 15 hours. So, rate of the leak is  $-\frac{1}{15}$

So, combined rate =  $\frac{1}{10} - \frac{1}{15} = \frac{1}{30}$

Time taken is 30 hours.

So, sufficient. Eliminate answer choices C and E.

**Hence the answer is B.**

**Question No.24:**

If 'x' is a number such that  $x^2 - 5x + 4 < 0$  and  $x^2 - 3x + 2 < 0$ , which of the following can be the value of 'x'?

- A. 3.5
- B. 3.0
- C. 2.4
- D. 1.6
- E. 0.8

**Answer: D**

**Explanation:**

Given that,  $x^2 - 5x + 4 < 0$  and  $x^2 - 3x + 2 < 0$

Let's solve the quadratic inequality

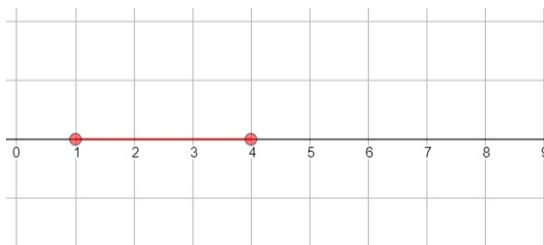
Whenever a quadratic inequality or higher order inequality are given. Then,

- Identify the co-efficient of highest degree whether it is positive or not (if not make it positive)
- Find the roots (critical points) of the given inequality
- Place the roots on the number line.
- Range greater than the greatest root is positive
- All other ranges will take alternate signs. Starting from extreme right.

$$x^2 - 5x + 4 < 0$$

$$(x - 4)(x - 1) < 0$$

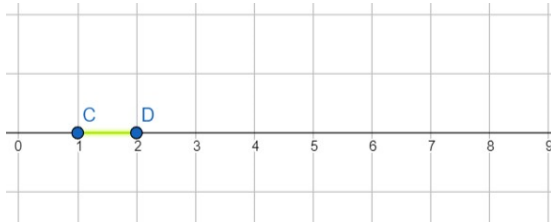
So,  $1 < x < 4$



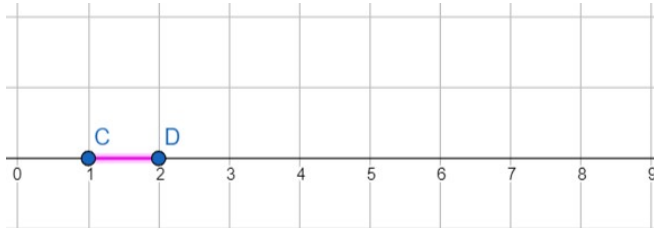
$$x^2 - 3x + 2 < 0$$

$$(x - 2)(x - 1) < 0$$

So,  $1 < x < 2$



Now combining both, as “x” satisfies both  $x^2 - 5x + 4 < 0$  and  $x^2 - 3x + 2 < 0$



Hence “x” lies between 1 and 2.

**So, the answer is D**

**Question No.25:**

If  $p^2$  is an integer and  $\sqrt{p^6 - p^4 - q - 1} = 10$ , what is the value of “ $p^2$ ”?

- I.  $p^2 = \sqrt{p^2 + 20}$
- II.  $q = \sqrt{q + 2}$

- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: D**

**Explanation:**

Given,  $p^2$  is an integer, so “p” may or may not be an integer.

$$\text{Also given that, } \sqrt{p^6 - p^4 - q - 1} = 10$$

Let's simplify this,

Squaring on both sides we get,

$$p^6 - p^4 - q - 1 = 100$$

$$\text{Let } p^2 = X$$

$$X^3 - X^2 - q - 1 = 100$$

**Question:** We need to find the value of “X”?

**Statement I is sufficient:**

$$p^2 = \sqrt{p^2 + 20}$$

$$\text{Solving it, } p^2 = X$$

$$X = \sqrt{X + 20}$$

Squaring on both sides,

$$X^2 = X + 20$$

$$X^2 - X - 20 = 0$$

So, “X” could be either 5 or -4

$$\text{We know that, } p^2 = X$$

$$\text{So, } p^2 = 5 \text{ or } p^2 = -4$$

But  $p^2$  cannot be negative, as it is a square of an integer.

So,  $p^2 = 5$  only this is true.

So, it is sufficient. Eliminate answer choices B, C and E.

Answers could be either A or D.

**Statement II is sufficient:**

$$q = \sqrt{q + 2}$$

Squaring on both sides,

$$q^2 = q + 2$$

$$q^2 - q - 2 = 0$$

So, “q” could be either 2 or -1

Let’s substitute “q = 2” value in the given equation.

$$X^3 - X^2 - q - 1 = 100$$

$$X^3 - X^2 - 2 - 1 = 100$$

$$X^2(X - 1) = 103$$

103 is a prime number and “X” is an integer, so  $X^2$  cannot be equal to 103.

So, then  $q = -1$

Let’s substitute “q=2” value in the given equation.

$$X^3 - X^2 - q - 1 = 100$$

$$X^3 - X^2 - (-1) - 1 = 100$$

$$X^3 - X^2 = 100$$

$$X^2(X - 1) = 100$$

Since “X” is an integer. X, (X-1) are two consecutive integers.

So, only 5 works here.

We know that,  $p^2 = X$

So,  $p^2 = 5$ .

So, it is sufficient. Eliminate the answer choice A.

**Hence the answer is D.**

**Question No.26:**

If “P” is a positive integer, is  $P^4 + 7$  an odd number?

- I. “P” is the smallest integer such that is divisible by all the integers from 51 to 55, inclusive.



- II.  $13^P$  is an odd number.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: A**

**Explanation:**

Given,  $P > 0$  and integer.

Given question: Is  $P^4 + 7$  an odd number?

**Rule/Concept:**

EVEN+ODD = ODD

EVEN+EVEN = EVEN

ODD+ODD = EVEN

Since “7” is an odd number, we need to find whether “P” is even or not, if “P” is even then “ $P^4$ ,” is even.

**Question: Is “P” even?**

**Statement I is sufficient:**

“P” is the smallest integer such that is divisible by all the integers from 51 to 55, inclusive.

So, we need to find the L.C.M of 51, 52, 53, 54, and 55

But not necessary, since 52 and 54 are even numbers, then the least common multiple should be a multiple of two.

Hence “P” is an even number.

So, it is sufficient. Eliminate answer choices B, C and E.

Answers could be either A or D.

**Statement II is insufficient:**

$13^P$  is an odd number.

If  $P = 1$ , then 13 is an odd number, but  $P$  is odd. Answer NO to the actual question.

If  $P = 2$ , then 169 is an odd number, but  $P$  is even. Answer YES to the actual question.

Eliminate the answer choice D.

**Hence the answer is A.**

**Question No.27:**

If 'm' is a positive integer, is " $m^2 + 1$ " when divided by 10 leaves remainder ZERO?

- I.  $101^{16} * m$ , when divided by 2 leaves a remainder 1.
  - II.  $101^{16} * m$ , when divided by 5 leaves a remainder 2.
- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
  - B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
  - C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
  - D. Each statement alone is sufficient to answer the question.
  - E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: C**

**Explanation:**

Given  $m > 0$  and integer.

Question: Is " $m^2 + 1$ " when divided by 10 leaves remainder ZERO?

That is, remainder zero when divided by 10 means is  $m^2 + 1$  is multiple of 10.

**Rule/Concept:** Any multiple of 10, unit's place should be zero.

If " $m^2$ " ends with 9, then  $m^2 + 1$  ends with zero.

**Question: Is unit's place of  $m^2$  is 9?**

**Statement I is insufficient:**

$101^{16} * m$ , when divided by 2 leaves a remainder 1.

Remainder rule:

$$\text{Remainder of } (A * B) = \text{Remainder of } (A) * \text{Remainder of } (B)$$

$$101^{16} = 101 * 101 * \dots 16 \text{ such times.}$$

101 when divided by 2 remainder is 1.

So, “m” also when divided by 2 leaves the remainder 1.

So, m could be 1, 3, 5, 7, 9...

If “m = 3” then  $m^2$  unit’s place is 9 and  $m^2 + 1$  units place is 0, so answer YES to the question.

If “m = 5” then  $m^2$  unit’s place is 5 and  $m^2 + 1$  units place is 6, so answer NO to the question.

Different answers for different values of “m”

So, it is insufficient. Eliminate answer choices A and D.

Answers could be either B, C or E.

**Statement II is insufficient:**

$$101^{16} * m, \text{ when divided by 5 leaves a remainder 2.}$$

Remainder rule:

$$\text{Remainder of } (A * B) = \text{Remainder of } (A) * \text{Remainder of } (B)$$

$$101^{16} = 101 * 101 * \dots 16 \text{ such times.}$$

101 when divided by 5 remainder is 1.

So, “m” when divided by 5, should leave the remainder 2.

So, m could be 2, 7, 12, 17, 22...

If “m = 2” then  $m^2$  unit’s place is 4 and  $m^2 + 1$  units place is 5, so answer NO to the question.

If “m = 7” then  $m^2$  unit’s place is 9 and  $m^2 + 1$  units place is 0, so answer YES to the question.

Different answers for different values of “m”

So, it is insufficient. Eliminate answer choice B.

**Together it is sufficient.**

“m” common values are 7, 17, 27, 37...

Since “7” is at the unit’s place of “m”, when we square it,  $m^2$  will have the unit’s place as 9.

Hence " $m^2 + 1$ " will always have the unit's place as 0.

**Hence the answer is C.**

**Question No.28:**

If "x" is a positive integer, is  $x > 3$ ?

I.  $\frac{105!}{55^x} = \text{integer}$

II.  $\frac{105!}{11^x} = \text{integer}$

- A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.
- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: E**

**Explanation:**

Given  $x > 0$  and integer.

**Question: Is  $x > 3$  ?**

**Statement I is insufficient:**

$$\frac{105!}{55^x} = \text{integer}$$

It means, 105! is divisible by  $55^x$

$$105! = 105 * 104 * 103 \dots * 3 * 2 * 1$$

**Rule/Concept:**

To find the number of 55's in a factorial, we need to count the number of 11's in it.

Prime factorization of  $55 = 11 * 5$

Because a pair of 5 and 11 in a factorial, makes a 55.

But as number of 11's is less in a factorial, we need to count only the number of 11's in it, as for every 11 there is a 5 in the factorial product, which will form a 55.

We need to find the number of 11's in 105!

$$105! = 105 * 104 * 103 \dots * 3 * 2 * 1$$

Let's try identify the 11's in 105!

$$105! = 99 * 88 * 77 * 66 * 55 * 44 * 33 * 22 * 11$$

	Total number of 2's
Number of 11's = $\frac{105}{11} = 9$	9
Number of 25's = $\frac{105}{11^2} = 0$	0
Total	9+0 = 9

So, "maximum" value of "x" could be 9. But "x" minimum could be 1 also.

If x = 1, then the answer to the question is NO.

But if x = 9, then the answer to the question is YES.

So, it is insufficient. Eliminate answer choices A and D.

Answers could be either B, C or E.

**Statement II is insufficient:**

$$\frac{105!}{11^x} = \text{integer}$$

Similar to the statement I,

Here it is given directly as  $11^x$ .

From the previous statement we know that, "x" maximum could be 9.

But "x" minimum could be 1 also.

If x = 1, then the answer to the question is NO and if x = 9, then the answer to the question is YES.

So, it is insufficient. Eliminate answer choice B.

**Together also it is insufficient.**

Both the statements give the same information and they are insufficient.

So, together we don't get anything new.

So, still is not sufficient.

**Hence the answer is E.**

**Question No.29:**

If “p” is completely divisible by the number 17, and  $p = x^2 * y$ , where “x” and “y” are distinct prime numbers, which of these numbers must be divisible by 289?

- A.  $x^2$
- B.  $y^2$
- C.  $xy$
- D.  $x^2y^2$
- E.  $x^3y$

**Answer: D**

**Explanation:**

First thing to note, “must-be” means “ALWAYS” true.

Given that “p” is multiple of 17.

Also,  $p = x^2 * y$

Since “x” and “y” are prime numbers and “p” is a multiple of 17, then one of “x” and “y” has to be 17.

**Question:** Which of these numbers must be divisible by 289? i.e., divisible by  $17^2$

Since it is a “MUST-BE” question, lets disprove the answer choices.

If  $x = 17$  and  $y = 2$

- A.  $x^2 = 17^2$ . Hold on.
- B.  $y^2 = 2^2$ . Eliminate it is not divisible by  $17^2$
- C.  $xy = 17*1$ . Eliminate it is not divisible by  $17^2$
- D.  $x^2y^2 = 17^2 * 2^2$ . Hold on
- E.  $x^3y = 17^3 * 2^2$ . Hold on

Next, we need to check only between A, D and E.

Now let's swap x and y values.

If  $x = 2$  and  $y = 17$

A.  $x^2 - 2^2$ . Eliminate it is not divisible by  $17^2$

D.  $x^2 y^2 - 2^2 * 17^2$ . Hold on

E.  $x^3 y - 2^3 * 17$ . Eliminate it is not divisible by  $17^2$

Hence the answer is D.

Alternatively, since the question says, "p" is multiple of 17, one of "x" and "y" has to be 17.

Question: Which options divisible by  $17^2$

We don't whether "x" is 17 or "y" is 17 but one of them certainly 17.

So, it is "MUST-BE", if we take " $x^2 * y^2$ ", it is certainly divisible by  $17^2$

**Hence the answer is D.**

### Question No.30:

List A has seven integers; whose range is 80 and median is 240. The median for the three smallest integers in List A is 180. What is the possible range for the largest three integers in the List A?

- I. 75
  - II. 24
  - III. 0
- 
- A. I only
  - B. II only
  - C. I and III only
  - D. II and III only
  - E. III only

**Answer: E**

### Explanation:

**Rule/Concept:** *Median is the middlemost term when arranged in an ascending order.*

Here is odd number of terms, so the 4<sup>th</sup> term is the median. So, three terms above it and three terms below it.

Given, Median is 240.

Let the numbers be,

A, B, C, D, E, F and G in ascending order

So,  $D = 240$

Median for three smallest integers is 180.

i.e.,  $B = 180$

A, 180, C, 240, E, F, G

Given, range is 80.

i.e.,  $G - A = 80$

Question: Possible value of “ $G - E$ ”

Minimum value for “ $G$ ” could be 240 then Range,  $240 - A = 80$

So, A could be 160

List could be, 160, 180, C, 240, 240, 240, 240

So, range of last three integers minimum is 0. That is,  $G - E = 0$

Maximum value for “ $A$ ” could be 180 then Range,  $G - 180 = 80$

So, G could be 260

List could be 180, 180, C, 240, 240, F, 260

So, range of last three integers maximum is 20. That is,  $260 - 240 = 20$

So, range of  $G - E$  lies between 0 and 20 inclusive

Range of largest three cannot be greater than 20.

Only III statement is true.

**So, the answer is E.**

**Question No.31:**

In a list  $A = p, 24, 24, 24, 28, 20, 16$ ; Is “ $p$ ” positive?

- I. The mean of list A is lesser than the mode of list A.
- II. The range of list A is lesser than the mode of list A.

A. Statement I alone is sufficient but statement II alone is not sufficient to answer the question asked.



- B. Statement II alone is sufficient but statement I alone is not sufficient to answer the question asked.
- C. Both statements I and II together are sufficient to answer the question but neither statement is sufficient alone.
- D. Each statement alone is sufficient to answer the question.
- E. Statements I and II are not sufficient to answer the question asked and additional data is needed to answer the statements.

**Answer: B**

**Explanation:**

**Rule/Concept:**

*Mode in a list is nothing but the number which repeats the highest number of times.*

Given list A = p, 24, 24, 24, 28, 20, 16

The mode of this list is automatically 24, no matter whatever be the value of “p” as 24 appears three times already.

**Statement I is insufficient:**

The mean of list A is lesser than the mode of list A.

That is, the mean is less than 24.

The mean of the values we know already is clearly less than 24.

$$\frac{24+24+24+28+20+16}{6} \sim 22.66$$

So, if p is anything less than 24, it will be absolutely certain we get a mean less than 24 overall, and “p” can be either positive or negative.

So not sufficient.

Eliminate answer choices A and D. Answers could be either B, C or E.

**Statement II is sufficient:**

The range of list A is lesser than the mode of list A.

*Range = Maximum value – Minimum Value*

Range is less than 24.

We have '28' in the list which is greatest number, p must be greater than 4 then only range will be less than 24.

$$p > 4$$

So, this is sufficient.

**Hence the answer is B.**