

# Mphasis Quantitative Aptitude Model Placement Paper



1. The cube of the difference of two numbers 'a' and 'b' is 27 and the product of these numbers is 40. Find the value of  $(2a^2 + 2ab + 2b^2)$ . Given  $a > b$ .

- a) 224
- b) 232
- c) 258
- d) 246

Correct Choice: c

Explanation:

According to the question,

$$(a - b)^3 = 27$$

$$(a - b) = 3$$

$$\text{Also, } ab = 40$$

$$\text{Therefore, } (a - b)^3 = a^3 - b^3 - 3ab(a - b)$$

$$\text{Or, } 27 = a^3 - b^3 - 3 \times 40 \times 3$$

$$\text{Or, } a^3 - b^3 = 387$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$\text{Or, } 387 = 3 \times (a^2 + ab + b^2)$$

$$\text{Or, } (a^2 + ab + b^2) = 387/3 = 129$$

$$\text{Therefore, } 2(a^2 + ab + b^2) = 2 \times 129 = 258$$

Hence, option c.

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2. Article 'A' is marked up by 20% and then sold after giving some discount. The loss of article 'B' is equal to the discount offered on article 'A'. If article 'A' and 'B' is sold at loss of 14% and 28% respectively and the cost price of article 'B' is Rs. 675 more than that of 'A', then find the cost price of article 'A'.

- a) Rs. 3540
- b) Rs. 3150
- c) Rs. 2850
- d) Rs. 3720

Correct Choice: b

Explanation:

Let the cost price of article 'A' be Rs.  $x$

Therefore, selling price of article 'A' = Rs.  $0.86x$

Marked price of article 'A' = Rs.  $1.2x$

Discount given on article 'A' =  $1.2x - 0.86x = \text{Rs. } 0.34x$

According to the question,

$$0.34x/0.28 - x = 675$$

$$\text{Or, } 0.06x = 189$$

$$\text{Or, } x = 189/0.06 = \text{Rs. } 3150$$

Hence, option b.

3. In a circle of radius 25 cm, find the perpendicular distance of a chord having the length of 40 cm, from the centre.

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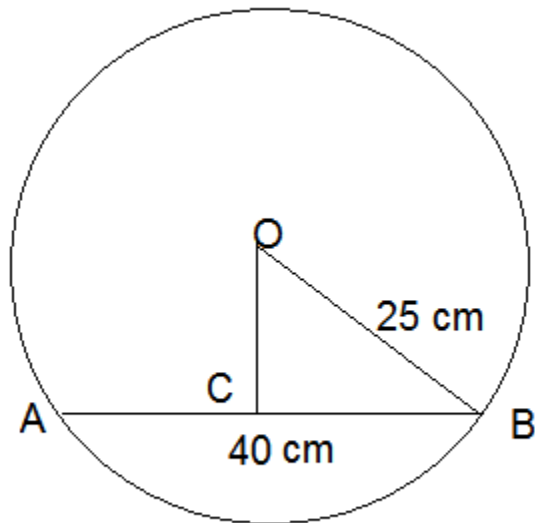


- a) 10 cm
- b) 15 cm
- c) 12 cm
- d) 20 cm

Correct Choice: b

Explanation:

According to the question,



Since the perpendicular from centre bisect the chord, therefore,  $BC = 40/2 = 20$  cm

Therefore,  $OC = \sqrt{(25^2 - 20^2)} = \sqrt{(625 - 400)} = \sqrt{225} = 15$  cm

Hence, option b.

4. The value of  $\{3.6 + (7.2 \div 0.6) \times 0.5 - 6.6\} \times 5$  is

- a) 21
- b) 15

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c) 12

d) 18

Correct Choice: b

Explanation:

$$\{3.6 + 12 \times 0.5 - 6.6\} \times 5$$

$$= \{3.6 + 6 - 6.6\} \times 5$$

$$= 15$$

Hence, option b.

5. 10 years ago, Rohit's age was 25% less than the present age of Vicky. The sum of the present ages of Rohit and Raghu is 60 years. The present age of Raghu and Vicky can be:

I. 32, 24

II. 33, 28

III. 26, 32

A -Only II

B -Only II and III

**C -Only I and III**

D -Only I

### Solution

Let the present age of Vicky be 'x' years

Therefore, present age of Rohit =  $(0.75x + 10)$  years

Present age of Raghu =  $60 - (0.75x - 10) = (50 - 0.75x)$  years

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For I:

Present age of Vicky = 24 years

Therefore, present age of Raghu =  $50 - 0.75x = 50 - 18 = 32$  years

Therefore, I can be the answer.

For II:

Present age of Vicky = 28 years

Therefore, present age of Raghu =  $50 - 0.75x = 50 - 21 = 29$  years

Therefore, II cannot be the answer.

For III:

Present age of Vicky = 32 years

Present age of Raghu =  $50 - 0.75x = 50 - 24 = 26$  years

Therefore, III can be the answer.

Hence, option c.

6. The sum of the cost price of two articles 'A' and 'B' is Rs. 10000. The cost price of article 'B' and the selling price of article 'A' are equal. Article 'A' and article 'B' is marked up by 30% and 40% above their respective cost prices. If the discount offered on article 'B' is equal to that of 'A', and article 'B' is sold for Rs. 7350, then find the discount offered on both the articles.

**A -Rs. 350**

B -Rs. 200

C -Rs. 450

D -Rs. 250

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## Solution

Let the cost price of article 'A' be Rs. 'x'.

Therefore, cost price of article 'B' and selling price of article 'A' = Rs.  $(10000 - x)$

Marked price of article 'A' = Rs.  $1.3x$

Discount offered on article 'A' =  $1.3x - (10000 - x) = \text{Rs. } (2.3x - 10000)$

Marked price of article 'B' = Rs.  $1.4(10000 - x)$

Selling price of article 'B' =  $1.4(10000 - x) - (2.3x - 10000) = \text{Rs. } (24000 - 3.7x)$

According to the question,

$$24000 - 3.7x = 7350$$

$$\text{Or, } 3.7x = 16650$$

$$\text{Or, } x = 16650/3.7 = \text{Rs. } 4500$$

Therefore, discount offered on each article =  $(2.3x - 10000) = \text{Rs. } 350$

Hence, option a.

7. Rihaan has a sum of Rs.  $5x$  with him. He invested 40% of the sum at 30% p.a. simple interest for 5 years. He then invested half of the interest received by him along with the remaining sum at 20% p.a. compound interest for 2 years, compounded annually and received Rs. 9720 as the amount. The amount received at simple interest on Rs.  $5x$  for 2 years at 20% p.a. will be:

I. Rs.  $(x + 9000)$

II. Rs.  $\{(3x/5 + 9600)\}$

III. Rs.  $(3x + 3000)$

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**A -Only I and II**

B -Only III

C -All I, II and III

D -Only I

## **Solution**

Sum invested by Rihaan at simple interest =  $0.4 \times 5x = \text{Rs. } 2x$

Therefore, interest received by Rihaan =  $(2x \times 30 \times 5)/100 = \text{Rs. } 3x$

Sum invested at compound interest =  $3x + 3x/2 = \text{Rs. } 4.5x$

According to the question

$$4.5x(1 + 20/100)^2 = 9720$$

$$\text{Or, } 6.48x = 9720$$

$$\text{Or, } x = \text{Rs. } 1500$$

Therefore, total sum =  $5x = \text{Rs. } 7500$

Therefore, amount received at simple interest =  $(7500 \times 2 \times 20)/100 + 7500 = \text{Rs. } (3000 + 7500) = \text{Rs. } 10500$

For I:

$$(x + 9000) = \text{Rs. } (1500 + 9000) = \text{Rs. } 10500$$

Therefore, I can be the answer.

For II:

$$\{(3x/5) + 9600\} = \{(3 \times 1500)/5 + 9600\} = \text{Rs. } 10500$$

Therefore, II can be the answer.

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For III:

$$(3x + 3000) = (3 \times 1500 + 3000) = \text{Rs. } 7500$$

Therefore, III cannot be the answer.

Hence, option a.

8. A box contains 12 yellow and 15 pink balls. A ball is randomly drawn from the box and put in a bag which contains violet, pink and yellow balls in the ratio 2:1:2 respectively. Now, a ball is randomly drawn from the bag and the probability that the drawn ball is of yellow colour is  $\frac{65}{162}$ . Find the total number of pink balls in the bag.

A -6

B -4

C -5

**D -7**

## Solution

Let the bag contains '2x' violet, 'x' pink and '2x' yellow balls initially.

Case I: A yellow ball is drawn from the box

$$\text{Probability of drawing yellow ball from the bag} = \frac{12}{27} \times \left\{ \frac{2x+1}{5x+1} \right\}$$

Case II: A pink ball is drawn from the box

$$\text{Probability of drawing yellow ball from the bag} = \frac{15}{27} \times \left\{ \frac{2x}{5x+1} \right\}$$

$$\text{So, the probability of drawing a yellow ball from the bag} = \frac{12}{27} \times \left\{ \frac{2x+1}{5x+1} \right\} + \frac{15}{27} \times \left\{ \frac{2x}{5x+1} \right\} = \frac{65}{162}$$



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$$\frac{(24x + 12 + 30x)}{27(5x + 1)} = \frac{65}{162}$$

$$6(54x + 12) = 65(5x + 1)$$

$$324x + 72 = 325x + 65$$

$$x = 7$$

So, the total number of pink balls in the bag = 7

Hence, option d.

9. Rishav can complete a work in 24 days. Arun is 20% less efficient than Rishav. Ankit takes 5 days less than Arun to complete the same work alone. Rishav and Arun started the work together and left after completing 90% of the work. The remaining work is completed by Ankit alone. Find the total number of days taken to complete the work.

A -19.5 days

B -18.5 days

**C -14.5 days**

D -16.5 days

### Solution

Time taken by Arun to complete the work alone =  $24/0.80 = 30$  days

Time taken by Ankit to complete the work alone =  $30 - 5 = 25$  days

Let the total work = 600 units (L.C.M of 24, 30 and 25)

Efficiency of Rishav =  $600/24 = 25$  units/day

Efficiency of Arun =  $600/30 = 20$  units/day

Efficiency of Ankit =  $600/25 = 24$  units/day

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Time taken by Rishav and Arun to complete 90% of the work =  $0.90 \times 600 / (25 + 20) = 12$  days

Time taken by Ankit to complete the remaining work alone =  $0.10 \times 600 / 24 = 2.5$  days

Total time taken =  $12 + 2.5 = 14.5$  days

Hence, option c.

10. The shopkeeper sold all the balls from bag A, after marking it 85% above the cost price and sold it after giving two successive discounts of 10% and 25%. Find the selling price of all the balls together.

A -Rs. 990

B -Rs. 899

**C -Rs. 999**

D -Rs. 1099

## Solution

Bag A:

Number of blue balls = 12

Number of red balls =  $12 / 1.2 = 10$

Number of green balls =  $1.8 \times 10 = 18$

Let the number of violet balls be  $x$

According to question,

$$x / (12 + 10 + 18 + x) = 2/7$$

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$$7x = 80 + 2x$$

$$5x = 80$$

$$x = 16$$

Bag B:

Let us denote number of Red, Green, Blue and Violet balls is R, G, B and V.

According to question,

$$V:B = 1:3$$

$$B:G = 5:4$$

$$R:G = 5:6$$

$$R:G:B:V = 10:12:15:5$$

Let number of Red, Green, Blue and Violet balls be  $10y$ ,  $12y$ ,  $15y$  and  $5y$  respectively.

According to Question,

$$({}^{12y}C_1 \times {}^{15y}C_1) / {}^{42y}C_2 = 120/581$$

$$(12y \times 15y \times 2) / [(42y)(42y - 1)] = 120/581$$

$$y / [14 \times (42y - 1)] = 1/581$$

$$581y = 588y - 14$$

$$7y = 14$$

$$y = 2$$

Bag C:

$$\text{Total number of balls} = 24 + 12 + 10 + 18 + 16 = 80$$

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Total number of red and blue balls =  $0.6 \times 80 = 48$

Let number of blue balls be 'a'

Number of red balls =  $2a$

So,  $a + 2a = 48$

$3a = 48$

$a = 16$

Number of green balls and violet balls =  $80 - 48 = 32$

Let number of green balls be 'p'

Number of violet balls =  $0.6p$

So,  $p + 0.6p = 32$

$1.6p = 32$

$p = 20$

For Bag D:

Total number of balls =  $80 - 10 = 70$

Let number of red balls be 'z'

Number of violet balls = number of blue balls =  $z - 5$

Let number of green balls is 'b'

According to question,

$b/70 = 2/7$

$b = 20$

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$$\text{And, } z + z - 5 + z - 5 = 70 - 20$$

$$3z - 10 = 50$$

$$3z = 60$$

$$z = 20$$

| Balls/Bags | A  | B  | C  | D  | Total |
|------------|----|----|----|----|-------|
| Red        | 10 | 20 | 32 | 20 | 82    |
| Green      | 18 | 24 | 20 | 20 | 82    |
| Blue       | 12 | 30 | 16 | 15 | 73    |
| Violet     | 16 | 10 | 12 | 15 | 53    |
| Total      | 56 | 84 | 80 | 70 | 290   |

Cost price of all the balls from bag A =  $12 \times 10 + 18 \times 10 + 12 \times 15 + 16 \times 20 = \text{Rs. } 800$

Marked price of all the balls =  $1.85 \times 800 = \text{Rs. } 1480$

Selling price of all the balls =  $0.9 \times 0.75 \times 1480 = \text{Rs. } 999$

Hence, option c.

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11. The question consists of two statements numbered “I and II” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

A bag contains red, blue and green balls in the ratio 8:7:5 respectively. Find the total number of balls in the bag.

Statement I: Probability of drawing a red ball from the bag is  $2/5$ .

Statement II: Probability of drawing two green balls from the bag is  $1/19$ .

A -The data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.

**B -The data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.**

C -The data either in statement I alone or in statement II alone are sufficient to answer the question.

D -The data given in both statements I and II together are not sufficient to answer the question.

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## Solution

Statement I:

Let the bag contains  $8x$  red,  $7x$  blue and  $5x$  green balls.

So the probability of drawing a red ball from the bag =  ${}^{8x}C_1 / {}^{20x}C_1 = 2/5$

$$8x/20x = 2/5$$

$$2/5 = 2/5$$

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Since, 'x' is eliminated, so the total number of balls can't be determined.

So, data in statement I alone is not sufficient to answer the question.

Statement II:

Let the bag contains  $8x$  red,  $7x$  blue and  $5x$  green balls.

So the probability of drawing two green ball from the bag =  $\frac{{}^{5x}C_2}{{}^{20x}C_2} = 1/19$

$$5x(5x - 1)/20x(20x - 1) = 1/19$$

$$95x - 19 = 80x - 4$$

$$15x = 15$$

$$x = 1$$

So, the total number of balls in the bag =  $20 \times 1 = 20$

So, data in statement II alone is sufficient to answer the question.

Hence, option b.

12. In a rhombus ABCD, if  $\angle DBC = 40^\circ$  and  $AB = 12$  cm, then find the value of  $\angle DAB$ .

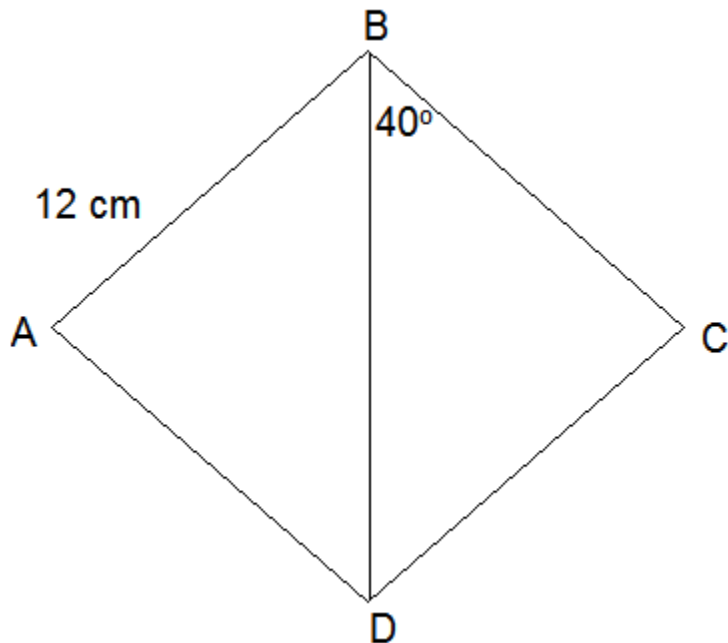
- a)  $80^\circ$
- b)  $120^\circ$
- c)  $100^\circ$
- d)  $60^\circ$

Correct Choice: c

Explanation:

According to the question,

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In a rhombus all the sides are equal.

Therefore,  $AB = BC = CD = DA = 12 \text{ cm}$

Since,  $BC = CD$  therefore,  $\angle DBC = \angle BDC = 40^\circ$

In  $\triangle BCD$ ,  $\angle BCD + \angle CBD + \angle BDC = 180^\circ$

Or,  $\angle BCD = 180^\circ - 40^\circ - 40^\circ = 100^\circ$

Since, opposite angles of rhombus are equal therefore,  $\angle BAD = \angle BCD = 100^\circ$

Hence, option c.

13. Directions: Answer the questions based on the information given below.

A, B and C started a business with initial investments of Rs. 1,200, Rs. 1,000 and Rs. 1,500, respectively. After one year, A and B made additional investments equal



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to 20% and 25% of their initial investments, respectively, whereas C withdrew 10% of his initial investment. After one more year, A, B and C withdrew all their investments and made small investments of Rs. 'x + 180', Rs. 'x + 220' and Rs. 'x + 320' respectively for a year to maintain the business.

Find the profit share of A, if total profit earned by A, B and C together at the end of three years is Rs. 9432.

A -Rs. 3024

B -Rs. 3572

**C -Rs. 3144**

D -Rs. 2358

## Solution

Investment of A till second year =  $1200 + 1200 \times 1.20 = \text{Rs. } 2,640$

Investment of B till second year =  $1000 + 1000 \times 1.25 = \text{Rs. } 2,250$

Investment of C till second year =  $1500 + 1500 \times 0.90 = \text{Rs. } 2,850$

Respective ratio of the profits of A, B and C =  $(2640 + x + 180):(2250 + x + 220):(2850 + x + 320)$

=  $(2820 + x):(2470 + x):(3170 + x)$

According to question,

Profit share of A =  $\{(x + 2820)/(x + 2820 + x + 2470 + x + 3170)\} \times 9432$

=  $\{(x + 2820)/(3x + 8460)\} \times 9432$

=  $1/3 \times 9432 = \text{Rs. } 3144$

Hence, option c.

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14. The perimeter of an isosceles triangle is 132 cm. The equal sides of the triangle is  $(7/8)$ th of its base. Find the base of the isosceles triangle.

- a) 46 cm
- b) 48 cm
- c) 56 cm
- d) 36 cm

Correct Choice: b

Explanation:

Let the base of the triangle be  $8a$  cm.

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Therefore, other two sides of the triangle =  $(7/8) \times 8a = 7a$  cm

According to the question,

$$7a + 7a + 8a = 132$$

$$\text{Or, } 22a = 132$$

$$\text{Or, } a = 132/22 = 6 \text{ cm}$$

Therefore, base of the triangle =  $8a = 48$  cm

Hence, option b.

16. The radius of the base of a cone is 7 metres and its slant height is 55 metres. The curved surface of a cylinder is 20% less than that of cone. The curved surface area of the cylinder is  $352 \text{ m}^2$  more than its area of the base. Find the height of the cylinder.

- a) 18 metres
- b) 15 metres
- c) 11 metres
- d) 16 metres

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Correct Choice: c

Explanation:

Curved surface area of the cone =  $\pi rl = (22/7) \times 7 \times 55 = 1210 \text{ m}^2$

Therefore, curved surface area of the cylinder =  $0.80 \times 1210 = 968 \text{ m}^2$

Let the area of the base of the cylinder be 'b'  $\text{m}^2$

According to the question,

$$968 - b = 352$$

$$\text{Or, } b = 616$$

$$\text{Therefore, } \pi r^2 = 616$$

$$\text{Or, } r^2 = (616 \times 7)/22 = 196$$

$$\text{Therefore, } r = 14 \text{ m}$$

$$\text{Or, } 2\pi rh = 968$$

$$\text{Or, } h = 968 \times (7/22 \times 28) = 11 \text{ metres}$$

Hence, option c.