

The Brigade School-Unit Test:1 (2020-21)

Total points 16/25 ?

Mathematics

Std: 10

Max.Marks: 25

Email address *

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0 of 0 points

Name of the Student: *

Manan Y Mehta ▼

Class / Sec : *

10 A ▼

Name of the School : *

TBSG ▼

Answer the following questions

16 of 25 points

Each Question Carries 3 Marks



✗ 1) The difference of squares of two numbers is 144. The square of the larger number is 25 times the smaller number. Find the numbers. * 1/3

Let the smaller number be x .

Thus the square of the larger number is $25x$.

Acc. to the question,

$$25x - x^2 = 144$$

$$x^2 - 25x + 144 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Feedback

Let the smaller number be y , \therefore the square of the larger number = $25y$

According to the question,

$$25y - y^2 = 144 \text{ -----(1 m)}$$

$$\text{ie, } y^2 - 25y + 144 = 0$$

$$(y - 9)(y - 16) = 0$$

$$\therefore y = 9 \text{ or } 16 \text{ -----(1 m)}$$

ie, if the smaller number is 9, then the larger number = $\sqrt{25 \times 9} = 15$

and if the smaller number is 16, then the larger number = $\sqrt{25 \times 16} = 20$

\therefore the required numbers are 9 & 15 or 16 & 20 -----(1 m)



- ✓ 2) The area of the base of a solid cylinder is 154 sq. cm and its volume is $\frac{3}{3}$ 3696 cu. cm. Find the Curved Surface Area of the solid. *

Area of base = 154 sq. cm

$$\pi r^2 = 154$$

$$\left(\frac{22}{7}\right) \times r \times r = 154$$

$$r^2 = (154 \times 7) / 22$$

$$r^2 = 49$$

$$r = 7 \text{ cm}$$

Volume = $\pi r^2 h$

$$3696 = \left(\frac{22}{7}\right) \times 7 \times 7 \times h$$

$$h = (3696 \times 7) / (22 \times 7 \times 7)$$

$$h = 3696 / (22 \times 7)$$

$$h = 24 \text{ cm}$$

CSA = $2\pi rh$

$$= 2 \times \left(\frac{22}{7}\right) \times 7 \times 24$$

$$= (44 \times 7 \times 24) / 7$$

$$= 44 \times 24$$

$$1056 \text{ sq.cm}$$

Thus, the CSA of the cylinder is 1056 sq.cm.

Feedback

$$V \text{ of cylinder} = \pi r^2 h = 3696$$

$$154 \times h = 3696$$

$$\therefore h = 3696 / 154 = 24 \text{ ----- (1 m)}$$

$$\text{Base area} = \pi r^2 = \frac{22}{7} \times r^2 = 154$$

$$\therefore r^2 = (154 \times 7) / 22 = 49$$

$$r = 7 \text{ ----- (1 m)}$$

$$\text{CSA of cylinder} = 2\pi rh = 2 \times \frac{22}{7} \times 7 \times 24$$

$$= 1056 \text{ sq. cm ----- (1 m)}$$



✗ 3) Seventh term of an A.P. is 30 and its 12th term is 50. Find its 17th term. 0/3
*

$$a + 6d = 0 \text{ -----(1)}$$

$$a + 11d = 50 \text{ -----(2)}$$

$$a = 50 - 11d \text{ -----(3)}$$

Substitute ----(3) in ----(1)

$$50 - 11d + 6d = 0$$

$$50 - 5d = 0$$

$$50 = 5d$$

$$d = 10$$

Substitute d in ----(1)

$$a + 6(10) = 0$$

$$a = -60$$

$$\text{The 17th term} = a + 16d$$

$$= -60 + 16(10)$$

$$= -60 + 160$$

$$= 100$$

Thus, the 17th term is 100.

Feedback

$$t_7 = a + 6d = 30$$

$$t_{12} = a + 11d = 50$$

$$\therefore 5d = 20$$

$$d = 4 \text{ -----(1 m)}$$

$$a + 6 \times 4 = 30$$

$$a = 30 - 24 = 6 \text{ -----(1 m)}$$

$$t_{17} = a + 16d$$

$$= 6 + 16 \times 4 = 70$$

$$\text{17th term of this A.P. is } 70 \text{ -----(1 m)}$$

Solve the following:

Each Question carries 4 Marks



- ✓ 4) Mohit paid ₹ 500 per month in a recurring deposit account for few years. At the time of maturity he received ₹ 13250 and the rate of interest was 10% p.a.; find the time(in years) for which the account was held. *

$$P = \text{Rs.} 500$$

$$MV = \text{Rs.} 13250$$

$$r = 10\%$$

$$n = ?$$

$$MV = (Pn) + \{[Pn \times (n+1) \times r] / [2 \times 12 \times 100]\}$$

$$13250 = (500n) + \{[500n \times (n+1) \times 10] / [2 \times 12 \times 100]\}$$

$$12 \times 13250 = 6000n + 25n + 25n^2$$

$$159000 = 6025n + 25n^2$$

$$n^2 + 241n - 6360 = 0$$

$$n^2 + 265n - 24n - 6360 = 0$$

$$n(n + 265) - 24(n + 265) = 0$$

$$(n+265)(n-24)=0$$

$$n+265=0 \text{ or } n-24=0$$

$$n = -265 \text{ or } 24$$

Time cant be negative. Thus $n = 24$.

Therefore the time is 24 months or 2 years.

Feedback

$$MV = pn + \{[pn(n+1)r] / (2 \times 12 \times 100)\}$$

$$13250 = 500 \times n + \{[500n(n+1)10] / 2400\} \text{ -----(1 m)}$$

$$13250 \times 12 = 6000n + 25n^2 + 25n$$

$$25n^2 + 6025n - 13250 \times 12 = 0$$

$$n^2 + 241n - 6360 = 0 \text{ -----(1 m)}$$

$$(n - 24)(n + 265) = 0$$

$$n = 24 \text{ or } -265 \text{ -----(1 m)}$$

Number of months can not be -ve,

\therefore number of months = 24

ie , the duration of the account was held is 2 years -----(1 m)



- ✗ 5) A statue is in the shape of an inverted hemisphere mounted on an inverted cone with the same radius. The height of the statue is 23 m and the radius of the base of the conical portion is 8 m. Determine the total surface area of the statue to the nearest sq. m. *

2/4

$$r = 8\text{m}$$

$$h = 23 - 8 = 15\text{m}$$

$$l = \sqrt{r^2 + h^2}$$

$$l = \sqrt{64 + 225}$$

$$l = \sqrt{289}$$

$$l = 17\text{m}$$

Total Surface Area of the statue = CSA of cone + TSA of hemisphere - Base area

$$= \pi r(l+r) + 3\pi r^2 - \pi r^2$$

$$= (22/7)(8)(17 + 8) + 2(22/7)(8 \times 8)$$

$$= 4400/7 + 2816/7$$

$$= 7216/7$$

$$= 1036.85 \text{ sq.m}$$

$$= 1037 \text{ sq.m}$$

Thus the TSA is 1037 sq.m

Feedback

Total surface area of the statue = CSA of hemisphere + CSA of the cone

$$= 2\pi r^2 + \pi r l$$

$$r = 8 \text{ cm}, h = 23 - 8 = 15 \text{ cm}, \therefore l = \sqrt{8^2 + 15^2} = 17 \text{ cm} \text{ -----}(1 \text{ m})$$

$$\text{TSA} = (2 \times 22/7 \times 8 \times 8) + (22/7 \times 8 \times 17) \text{ -----}(1+1 \text{ m})$$

$$= (22 \times 8 \times 33)/7$$

$$= 5808/7 = 829.7 \text{ sq. m}$$

$$= 830 \text{ sq. m} \text{ -----}(1 \text{ m})$$



- ✓ 6) Find the value of 'k' for which $y^2 + 2(k - 1)y + (k + 5) = 0$ has real and equal roots. *

4/4

$$b^2 - 4ac = 0$$

$$[2(k - 1)]^2 - [(4)(1)(k + 5)] = 0$$

$$(2k - 2)^2 - (4k + 20) = 0$$

$$4k^2 + 4 - 8k - 4k - 20 = 0$$

$$4k^2 - 12k - 16 = 0$$

$$k^2 - 3k - 4 = 0$$

$$k^2 + k - 4k - 4 = 0$$

$$k(k+1) - 4(k+1) = 0$$

$$(k+1)(k-4) = 0$$

$$k+1=0 \text{ or } k-4=0$$

$$k=-1 \text{ or } k=4$$

Thus, the value of k is -1 or 4.

Feedback

Since the roots are equal, $b^2 - 4ac = 0$ -----(1 m)

ie, $(2k - 2)^2 - 4 \times 1 \times (k + 5) = 0$ -----(1 m)

$$4k^2 - 8k + 4 - 4k - 20 = 0$$

ie, $k^2 - 3k - 4 = 0$ -----(1 m)

$$(k - 4)(k + 1) = 0$$

$\therefore k = 4 \text{ or } -1$ -----(1 m)



✗ 7) The 4th term of an A.P. is eleven and the 8th term exceeds twice the 4th term by five. Find the sum of its first 50 terms. *

2/4

$$a + 3d = 11 \text{ -----(1)}$$

$$a + 7d - 2(a + 3d) = 5$$

$$a + 7d - 2a - 6d = 5$$

$$-a + d = 5 \text{ -----(2)}$$

$$d = 5 + a \text{ -----(3)}$$

Substitute ----(3) in ----(1)

$$a + 3(5 + a) = 11$$

$$a + 15 + 3a = 11$$

$$4a = 11 - 15$$

$$a = -4/4$$

$$a = -1$$

From ----(3)

$$d = 5 + a$$

$$d = 5 + (-1)$$

$$d = 5 - 1$$

$$d = 4$$

$$S = (n/2)[a + (n-1)d]$$

$$S = (50/2)[-1 + (25-1)4]$$

$$S = 25(-1 + 96)$$

$$S = 25 \times 95$$

$$S = 2375$$

Thus, the sum is 2375.

Feedback

$$t_4 = a + 3d = 11$$

$$t_8 = 2 \times t_4 + 5$$

$$a + 7d = 2 \times 11 + 5$$

$$a + 7d = 27$$

$$\therefore 4d = 16$$

$$d = 4 \text{ -----(1 m)}$$

$$a + 3 \times 4 = 11$$

$$\therefore a = -1 \text{ -----(1 m)}$$

$$S_n = \frac{1}{2} n [2a + (n-1)d]$$

$$S_{50} = 50/2 [2 \times -1 + 49 \times 4] \text{ -----(1 m)}$$

$$= 25 \times (-2 + 196)$$

$$= 25 \times 194$$

$$S_{50} = 4850 \text{ -----(1 m)}$$



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