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

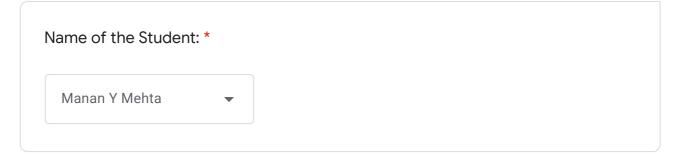
Total points 16/25

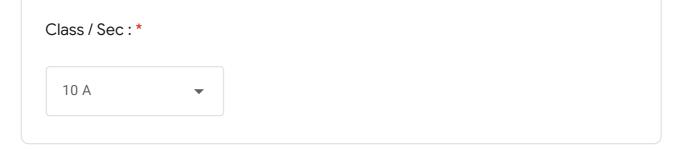


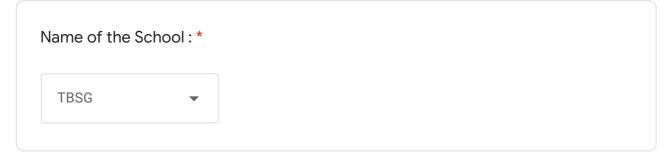
Mathematics Std: 10 Max.Marks: 25

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0 of 0 points







Answer the following questions

16 of 25 points

Each Question Carries 3 Marks

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

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 = [-b]

Feedback

Let the smaller number be y, \therefore the square of the larger number = 25 y According to the question, $25 \text{ y} - \text{y}^2 = 144$ -----(1 m) ie, $y^2 - 25y + 144 = 0$ (y - 9) (y - 16) = 0y = 9 or 16 ---- (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 = $\sqrt{25} \times 16 = 20$:: 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 3/3 3696 cu. cm. Find the Curved Surface Area of the solid. *

```
Area of base = 154 sq. cm
\pi r^2 = 154
(22/7) x r x r = 154
r^2 = (154 \times 7)/22
r^2 = 49
r=7 cm
Volume = \pi r^2h
3696 = (22/7) \times 7 \times 7 \times h
h = (3696 \times 7)/(22 \times 7 \times 7)
h = 3696 / (22 x 7)
h=24 cm
CSA = 2\pi rh
      = 2 \times (22/7) \times 7 \times 24
      = (44 \times 7 \times 24)/7
      = 44 \times 24
      1056 sq.cm
```

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

Feedback

```
V of cylinder = \pi r^2 h = 3696
154 x h = 3696
∴ h = 3696/ 154 = 24 ----- (1 m)
Base area = \pi r^2 = 22/7 \times r^2 = 154
r^2 = (154 \times 7) / 22 = 49
r = 7 ----- (1 m)
CSA of cylinder = 2\pi rh = 2 \times 22/7 \times 7 \times 24
= 1056 sq. cm ----- (1 m)
```

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

$$a + 6d = 0$$
 ------(1)
 $a + 11d = 50$ ------(2)
 $a = 50 - 11d$ -----(3)
Substitute ----(3) in -----(1)
 $50 - 11d + 6d = 0$
 $50 - 5d = 0$
 $50 = 5d$
 $d = 10$
Substitute d in -----(1)
 $a + 6(10) = 0$
 $a = -60$
The 17th term = $a + 16d$
 $= -60 + 16(10)$
 $= -60 + 160$

Thus, the 17th term is 100.

= 100

Feedback

$$t 7 = a + 6 d = 30$$

 $t 12 = a + 11 d = 50$
 $\therefore 5 d = 20$
 $d = 4$ ------(1 m)
 $a + 6 \times 4 = 30$
 $a = 30 - 24 = 6$ ------(1 m)
 $t 17 = a + 16 d$
 $= 6 + 16 \times 4 = 70$
17th term of this A.P. is 70 -----(1 m)

Solve the following:

Each Question carries 4 Marks

✓ 4) Mohit paid ₹ 500 per month in a recurring deposit account for few 4/4 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 = Rs.500
MV = 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 x 13250 = 6000n + 25n + 25n<sup>2</sup>
159000 = 6025n + 25n<sup>2</sup>
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 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]/(2x12x100)\}
13250 = 500 \times n + \{ [500 n (n + 1) 10] / 2400 \} -----(1 m)
13250 \times 12 = 6000 \text{ n} + 25 \text{ n}^2 + 25 \text{ n}
25 n^2 + 6025 n - 13250 x 12 = 0
n^2 + 241 n - 6360 = 0 -----(1 m)
(n - 24) (n + 265) = 0
n = 24 or -265 -----(1 m)
Number of months can not be -ve,
∴ number of months = 24
ie, the duration of the account was held is 2 years -----(1 m)
```

r = 8m

X 5) A statue is in the shape of an inverted hemisphere mounted on an 2/4 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. *

```
h=23-8=15m
I = \sqrt{(r^2 + h^2)}
I = \sqrt{(64 + 225)}
I = \sqrt{289}
I = 17m
Total Surface Area of the statue = CSA of cone + TSA of hemisphere - Base area
=\pi r(1+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 sq.m
=1037 \text{ sq.m}
```

Feedback

Thus the TSA is 1037 sq.m

```
Total surface area of the statue = CSA of hemisphere + CSA of the cone
= 2 \pi r^2 + \pi r I
r = 8 \text{ cm}, h = 23 - 8 = 15 \text{ cm}, : I = \sqrt{(8^2 + 15^2)} = 17 \text{ cm}
TSA = (2 \times 22/7 \times 8 \times 8) + (22/7 \times 8 \times 17) -----(1+1 \text{ m})
= (22 \times 8 \times 33)/7
= 5808/7 = 829.7 sq. m
= 830 sq. m ----(1 m)
```

 \checkmark 6) Find the value of 'k' for which $y^2 + 2(k - 1)y + (k + 5) = 0$ has real and 4/4 equal roots. *

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

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

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

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

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

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

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

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

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

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

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

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

Feedback

Since the roots are equal,
$$b^2 - 4ac = 0$$
 ------(1 m) ie, $(2k-2)^2 - 4x1x(k+5) = 0$ -----(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)

X 7) The 4th term of an A.P. is eleven and the 8th term exceeds twice the 2/4 4th term by five. Find the sum of its first 50 terms. *

```
a + 3d = 11 -----(1)
a + 7d - 2(a + 3d) = 5
a + 7d - 2a - 6d = 5
-a + d = 5 - - - (2)
d= 5 +a ----(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 x 95
S= 2375
```

Thus, the sum is 2375.

Feedback

```
t4 = a + 3d = 11
t8 = 2 \times t4 + 5
a + 7d = 2 \times 11 + 5
a + 7 d = 27
∴ 4 d = 16
d = 4 -----(1 m)
a + 3 x 4 = 11
a = -1 -----(1 m)
S n = \frac{1}{2} n [2a + (n - 1)d]
S 50 = 50/2 [2x-1+49x4] -----(1 m)
= 25 \times (-2 + 196)
= 25 \times 194
S 50 = 4850 -----(1 m)
```

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