What is the ratio of their savings?

MODEL QUESTIONS

1. The cross-section of a canal is a trapezium in shape. If the canal is 10m wide at the top and 6m wide at the bottom and the area of the cross-section is 640 m^2, the depth of the cross-section is:
A) 40m B) 80m
C) 160m D) 384m

2. Find the difference between simple interest and compound interest which is calculated annually for two years on Rs.256 at the rate of 10% per annum (in Rs.):
A) 25.6 B) 2.56
C) 1.28 D) 12.8

3. Two trains T_1 and T_2 start from stations A and B respectively and go towards B and A at 10 am and 11 am respectively. The speeds of T_1 and T_2 are 10 kmph and 15 kmph respectively. At what time will they meet, if A and B are 160 km apart?
A) 4 pm B) 5 pm
C) 7 pm D) 6 pm

4. If $\tan^2\theta = (1 - e^2)$, then $\sec\theta + \tan^3\theta\operatorname{cosec}\theta = ?$
A) $(2+e^2)^{\frac{3}{2}}$ B) $(2-e^2)^{\frac{3}{2}}$
C) $(1-e^2)^{\frac{3}{2}}$ D) $(1+e^2)^{\frac{3}{2}}$

5. If the angles of elevation of the top of a tower from two points distance s and t (s > t) from its foot are 30° and 60° respectively, then the height of the tower is:
A) $\sqrt{s^2+t^2}$ B) $\sqrt{st}$
C) $\sqrt{s^2-t^2}$ D) $\sqrt{\frac{s}{t}}$

6. P and Q can finish a work in 30 days. They worked at it for 10 days and then Q left. The remaining work is done by P alone in 20 more days. How long will P take to finish to work alone?
A) 30 days B) 20 days
C) 60 days D) 50 days

7. A is twice as fast as B and B is thrice as fast as C. The journey covered by C in 56 min will be covered by A in:
A) $5\frac{1}{3}$ min B) $2\frac{1}{3}$ min
C) $7\frac{1}{3}$ min D) $9\frac{1}{3}$ min

8. If $x(x + 1) + 1 = 0$, then the value of $(x+1)^3 + \frac{1}{(x+1)^3}$ is:
A) –2 B) –1
C) 1 D) 2

9. A sum of Rs. 53 is divided among A, B, C in such a way that A gets Rs.7 more than what B gets and B gets Rs. 8 more than what C gets. The ratio of their shares is:
A) 16 : 9 : 18
B) 25 : 18 : 10

C) 18 : 25 : 10
D) 15 : 8 : 30

10. The area of a rhombus is 144 cm^2. One of its diagonals is twice the other. The length of the shorter diagonal is:
A) 12cm B) $6\sqrt{2}$ cm
C) 6cm D) 24cm

11. If the height of a cone is doubled, then the increase in its volume is:
A) 100% B) 200%
C) 300% D) 400%

12. The ratio of incomes of P and Q is 6 : 5 and the ratio of their expenditures is 4 : 3. If P's expenditure is 4 times his savings, then what is the ratio of their savings?
A) 5 : 6 B) 6 : 7
C) 7 : 6 D) 6 : 5

13. If a, b, c are real and $a^2 + b^2 + c^2 = 2(a-b-c)-3$, then the value of 2a–3b+4c is:
A) –1 B) 0
C) 1 D) 2

14. In a class, there are two sections A and B. If 10 students of section B shift over to section A, the strength of A becomes three times the strength of B. But, if 10 students shift over from A to B, both A and B are equal in strength. How many students are there in sections A and B?
A) 50 and 30 B) 45 and 15
C) 90 and 40 D) 80 and 40

15. If the cost price of three bananas is equal to the selling price of two bananas, then find the percentage of profit.
A) 50% B) 25%
C) 20% D) 75%

16. In a recent survey, 40% houses contained two or more people. Of those houses containing only one person, 25% were having only a male. What is the percentage of all houses, which contain exactly one female and no males?
A) 15 B) 40 C) 75
D) None of these

17. If the length of the side PQ of the rhombus PQRS is 5 cm and ∠PQR = 120° then the length of QS, in cm, is:
A) 4 B) 6
C) 3 D) 5

18. Any cyclic parallelogram having unequal adjacent sides is necessarily a:
A) Square
B) Rectangle
C) Rhombus
D) Trapezium

19. The tangents are drawn at the extremities of a diameter AB of a circle with centre P. If a tangent to the circle at the point C intersects the other two tangents at Q and R, then the measure of the ∠QPR is:
A) 45° B) 60°
C) 90° D) 180°

20. The cost price of an article is 64% of the marked price. What is the gain percent if a discount of 12% is allowed?
A) 37.5% B) 48%
C) 50.5% D) 52%

21. The product of two co-primes is 117. Their L.C.M. should be:
A) 1 B) 117
C) Equal to their H.C.F.
D) Cannot be calculated

22. $\sqrt{6\sqrt{2}-2\sqrt{10}} =$ _____
A) $\sqrt{5}-1$ B) $\sqrt{5}+1$
C) $\sqrt[4]{2}(\sqrt{5}+1)$
D) $\sqrt[4]{2}(\sqrt{5}-1)$

23. What is the minimum value of the expression $3x^2+6x+8$?
A) – 4 B) –7
C) 6 D) 5

Solutions

1. B;
d: depth of cross-section =
$\frac{1}{2}\times d\times(a+b) = 640m^2$
$\Rightarrow \frac{1}{2}\times d\times(10+6) = 640$ ∴ d = 80m

2. B;
Time saver:
$D = P\left(\frac{R}{100}\right)^2$
$D = 256\left(\frac{10}{100}\right)^2 = \frac{256}{100} =$ Rs. 256

3. B; Distance travelled by T_1 from station A in 1 hour
= 10 × 1hr = 10 km
At 11 am, the distance between T_1 and T_2 is 150 km
Time taken to meet each other
$= \frac{150}{25} = 6$hrs.
=11am + 6hrs = 5 pm

4. B;
$\sec\theta + \tan^3\theta.\operatorname{cosec}\theta$
$= \frac{1}{\cos\theta} + \frac{\sin^3\theta}{\cos^3\theta}.\frac{1}{\sin\theta}$
$= \frac{\cos^2\theta+\sin^2\theta}{\cos^3\theta} = \frac{1}{\cos^3\theta} = \sec^3\theta$
$\therefore \sec^2\theta = 1+\tan^2\theta = 1+(1-e^2) = 2-e^2$
$\sec\theta = (2-e^2)^{\frac{1}{2}}$
$\therefore \sec^3\theta = (2-e^2)^{\frac{3}{2}}$

5. B;
$\tan 30° = \frac{h}{s}; \tan 60° = \frac{h}{t}$
$\tan 30° \times \tan 60° = \frac{h^2}{st}$
$\Rightarrow \frac{h^2}{st} = \tan 30° \times \cot 30° \Rightarrow h^2 = st$
$\Rightarrow h = \sqrt{st}$

6. A;
Work done by P and Q in 10 days $= \frac{1}{30}\times 10 = \frac{1}{3}$
Remaining work $= 1 - \frac{1}{3} = \frac{2}{3}$
Remaining work was done by P alone in 20 days
∴ Work done by P in 1 day
$= \frac{\frac{2}{3}}{20} = \frac{1}{30}$ ∴ P takes 30 days alone to complete the work

7. D;
A = 2B; B = 3C [speeds]
A : B : C = 6 : 3 : 1
Time ratio = 1 : 2 : 6
Time taken by A $= \frac{56}{6}\times 1 = 9\frac{1}{3}$ min.

8. A;
$x + \frac{1}{(x+1)} = 0$
$(x+1) + \left(\frac{1}{x+1}\right) = 1$
cubing on both sides
$(x+1)^3 + \frac{1}{(x+1)^3} = -2$

9. B;
A = B + 7; B = C + 8
∵A + B + C = 53
A+A–7+A–15 = 53 ⇒ A = 25
Ratio of amounts received by A, B & C = 25 : 18 : 10

10. A;
Area of rhombus = ½d_1d_2
$\frac{1}{2}\times 2d_2^2 = 144 \Rightarrow d_2 = 12cm (\because d_1 = 2d_2)$

11. A;
$V = \frac{1}{3}\pi r^2 h; V_1 = \frac{1}{3}\pi r^2 \times 2h$
$\Rightarrow \frac{V_1}{V} = \frac{2}{1}$
% increase in volume
= ¹⁄₁ ×100 = 100%

22. B;
$\frac{I_P}{I_Q} = \frac{6}{5}; \frac{E_P}{E_Q} = \frac{4}{3}$
$E_P = 4S_P \Rightarrow E_P = 4(I_P - E_P)$
$\Rightarrow E_P = \frac{4}{5}I_P;\ E_Q = \frac{18}{25}I_Q$
$\frac{S_P}{S_Q} = \frac{I_P - E_P}{I_Q - E_Q} = \frac{\frac{1}{5}I_P}{\frac{7}{25}I_Q} = \frac{5}{7}\times\frac{6}{5} = \frac{6}{7}$

13. C;
$a^2 + b^2 + c^2 = 2(a - b - c) - 3$
$(a-1)^2 + (b+1)^2 + (c+1)^2 = 0$
a = 1, b = –1, c =–1
2a – 3b + 4c ⇒ 2 + 3 – 4 = 1

14. A;
A + 10 = 3(B – 10)
A – 10 = B + 10
on solving A = 50, B = 30

15. A;
let c.p. of each banana is Rs. x
$3x$ = s.p. of two bananas
s.p. of each banana $= \frac{3x}{2}$
Profit% $= \frac{\frac{3x}{2} - x}{x}\times 100 = 50\%$

16. D;
Let there are 100 houses
Two or more people
= 40% (100) = 40
Only one person (i.e male)
= 25% (60) = 15
Only one person (i.e female)
= 60 – 15 = 45
% of houses only 1 female
$= \frac{45}{100}\times 100 = 45\%$

17. D;
O is intersection point of two diagonals PR and QS
In ΔPQO
$\cos 60° = \frac{QO}{PQ}\left[\because \angle PQO = \frac{1}{2}\angle PQR\right]$
$QO = \frac{5}{2}$ cm ∴ QS = 2 × QO = 5cm

18. B;

19. C;
$\angle APQ = \angle QPC = x°$,
$\angle CPR = \angle RPB = y°$
$\therefore \angle APQ + \angle QPC + \angle CPR + \angle RPB = 180°$
$2(x + y) = 180° \Rightarrow (x + y) = 90°$
$[\because \angle QPC + \angle CPR]$

20. A;
C.P. = 64%(M.P.)
S.P. = 88%(M.P.)
$\frac{S.P}{C.P} = \frac{88}{64} = \frac{11}{8}$
Profit% $= \frac{3}{8}\times 100 = 37.5\%$

21. B;

22. D;
$\sqrt{6\sqrt{2}-2\sqrt{10}} = \sqrt{\sqrt{2}(6-2\sqrt{5})}$
$= \sqrt{\sqrt{2}(\sqrt{5}-1)^2} = \sqrt[4]{2}(\sqrt{5}-1)$

23. D;
The expression has its minimum value at $x = \frac{-b}{2a} = \frac{-6}{2\times 3} = -1$
Minimum value
$= 3(-1)^2 + 6(-1) + 8 = 5$