How many hours required to fill the tank?

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MODEL QUESTIONS

1. In a family, a couple has a son and daughter. The age of the father is three times that of his daughter and the age of the son is half of his mother. The wife is nine years younger to her husband and the brother is seven years older than his sister. What is the age of the mother?
a) 40 years
b) 45 years c) 50 years
d) 60 years e) 65 years

2. A boat takes 26 hours for travelling downstream from point A to point B and coming back to point C midway between A and B. If the velocity of the stream is 4 km/hr and the speed of the boat in still water is 10 km/hr, what is the distance between A and B?
a) 210 km b) 185 km
c) 140 km d) 168 km
e) None of these

3. Arun, Kathir and Manoj entered into a partnership to construct a building by investing in the ratio of 4 : 6 : 7. After one year, Arun invested Rs, 80000 more and after one year, Manoj invested Rs. 120000 more. At the end of 3 years, their profits are shared in the ratio of 28 : 18 : 33. Find the initial investment of Kathir?
a) Rs. 45000
b) Rs. 40000 c) Rs. 55000
d) Rs. 60000 e) None of these

4. Two inlet pipes can fill an empty tank in 15 and 18 hours and one outlet pipe can empty the tank in 20 hours. If all the pipes opened simultaneously, then how many hours required to fill the tank?
a) $11\frac{8}{11}$ hours b) $12\frac{5}{7}$ hours
c) $13\frac{11}{13}$ hours d) $9\frac{5}{9}$ hours
e) None of these

5. The monthly income of Santhosh and Vignesh together is Rs. 62500. The income of Santhosh and Vignesh is increased by 20% and 15% respectively. The new income of Vignesh is Rs. 1375 more than the income of Santhosh. What is the new income of Vignesh?
a) Rs. 37375
b) Rs. 35625
c) Rs. 38250
d) Rs. 38350
e) None of these

Directions (6-10): Find the Wrong number in the following number series.

6. 729 1331 2497 3375 4913
a) 729 b) 1331 c) 3375
d) 2497 e) 4913

7. 8 8.5 11.5 14 17
a) 8 b) 8.5 c) 11.5
d) 14 e) 17

8. 7 16 27 40 46
a) 7 b) 16 c) 27
d) 40 e) 46

9. 439 778 1456 2812 5624
a) 439 b) 778 c) 1456
d) 2812 e) 5624

10. 80 119 166 221 223
a) 80 b) 119 c) 166
d) 192 e) 223

Directions (11-15): Simplify the following problems.

11. $(5568 \div 87)^{1/3} + (72 \div 2)^{1/2} = (?)^{1/2}$
a) 256 b) 81 c) 121
d) 100 e) 144

12. $\sqrt{13^2 + 28 \quad 4 - (3)^3 + 107} = ?$
a) 2 b) 16 c) 256
d) 4 e) $(256)^2$

13. $(0.49)^4 \times (0.343)^4 \div (0.2401)^4 = (70 \div 100)^{?+3}$
a) 3 b) 1 c) 4
d) 7 e) 2

14. 45 % of $\sqrt{2025}$ $0.01 = (?)^2$ 25
a) 3 b) 81^2
c) 225 d) 9
e) 12

15. $18.5 \times 21.4 \times ? = 6255.22$
a) 15.8 b) 14.6 c) 17.4
d) 17.2 e) 16.4

Directions (Q.No. 16-19) : Given below are two quantities named A & B. Based on the given information, you have to determine the relation between the two quantities. You should use the given data and your knowledge of Mathematics to choose between the possible answers.
a) Quantity A > Quantity B
b) Quantity A < Quantity B
c) Quantity A ≤ Quantity B
d) Quantity A ≥ Quantity B
d) Quantity A = Quantity B or No relation possible

16. The cost price of a bicycle is Rs. 200 and the selling price is Rs. 240.
Quantity A: Find the profit percent, if the discount percent is increased from 20% to 30%.
Quantity B: If the selling price is increased by 20%, then find the profit percent.

17. Find the distance covered.
Quantity A: A person saves 90 minutes when he increases his speed from 20 km/hr to 25 km/hr to cover a certain distance
Quantity B: If a person covers at a speed of 80 km/hr for 2 hours, then find the distance covered by him

18. Find the sum.
Quantity A: If the compound interest for 2 years at 20% rate of interest is Rs. 1320
Quantity B: The sum of money will produce Rs. 480 interest in 3 years at 4% simple interest.

19. Find the present age of P.
Quantity A: Three years before, the ratio of ages of P and Q was 5 : 6. Three years hence this ratio will become 6 : 7.
Quantity B: 10 years before the ratio of ages of P and Q was 1 : 3 and 10 years hence the ratio will become 1 : 2

Solutions

1) d; Let the of Daughter = x.
Then the age of Father = $3x$
And the age of mother is = $3x-9$
Age of the son = $\frac{(3x-9)}{2}$
$\frac{(3x-9)}{2} - x = 7$
$3x - 9 - 2x = 14 \Rightarrow x = 23$
Age of the mother = 60

2) d; Downstream speed=10+4= 14
Upstream speed = 10 − 4 = 6
Now total time is 26 hours If distance between A and B is d, then distance BC $= \frac{d}{2}$
Now distance/speed = time, so
$\frac{d}{14} + \frac{d/2}{6} = 26, \frac{d}{14} + \frac{d}{12} = 26, \frac{13d}{84} = 26$
Solve, d = 168 km

3) d; The share of Arun, Kathir and Manoj
$[4x\times1 + (4x + 80000) \times2]: [6x\times3]:[7x\times2+(7x + 120000)\times1]$
$= 28 : 18 : 33 = [4x + 8x + 160000] : [18x] : [14x + 7x + 120000]$
$= 28 : 18 : 33 = (12x + 160000) : (18x): (21x + 120000)$
$= 28 : 18 : 33$
$\Rightarrow \frac{12x + 160000}{18x} = \frac{28}{18}$
$\Rightarrow 12x + 160000 = 28x$
$\Rightarrow 160000 = 28x - 12x$
$\Rightarrow 16x = 160000 \Rightarrow x = 10000$
Initial investment of Kathir
$= 6x$ = Rs. 60000

4) c; If all the pipes are opened simultaneously, then in,
$\Rightarrow \left(\frac{1}{15}\right) + \left(\frac{1}{18}\right) - \left(\frac{1}{20}\right)$
$\Rightarrow \frac{12+10-9}{180} \Rightarrow \frac{13}{180}$
$\Rightarrow$ Required hours $= \frac{180}{13}$
$= 13\frac{11}{13}$ hours

5) a; Let the income of Santhosh and Vignesh be S and V,
The monthly income of Santhosh and Vignesh
= 62500 S + V = 62500
Santhosh's income = x;
Vignesh's income = 62500 − X
New income of V = New income of S + 1375
V's New income
$= (62500 - x) \quad \frac{115}{100}$
S's new income $= x \quad \frac{120}{100}$
$(62500 - x) \left(\frac{115}{100}\right) = x \left(\frac{120}{100}\right) + 1375$
$\frac{7187500 - 115x}{100} = \left(\frac{120x}{100}\right) + 1375$
$\frac{7187500 - 115x}{100} = \frac{120x + 137500}{100}$
$(7187500 - 115x)$
$= (120x + 137500)$
$7187500 - 137500$
$= 115x + 120x$
$7050000 = 235x$
Santhosh's income X
$= \left(\frac{7050000}{235}\right) = 30000$
Vignesh's income
$= 62500 - x = 32500$
New Income of Vignesh
$= 32500 \left(\frac{115}{100}\right) =$ Rs.37375

6) d; The series is 9^3, 11^3, 13^3, 15^3, 17^3,....
Hence, there should be 2197 in place of 2497

7) b; The series is
8 + 1.5 = 9.5, 9.5 +2
=11.5, 11.5 + 2.5
= 14, 14 +3 = 17
Hence, there should be 9.5 in place of 8.5

8) e; The series is 5×1+2 = 7,
6 × 2 + 4 = 16, 7 ×3 + 6 = 27,
8 × 4 + 8 = 40, 9 × 5+10 = 55.
Hence, there should be 55 in place of 46.

9) e; The series is +339, +679, +1356, +2712,....
Hence, there should be 5524 in place of 5624

10) e; The series is 9^2-1, 11^2-2, 13^2-3, 15^2-4, 17^2-5,...
Hence, there should be 284 in place of 223.

11) d; $(?)^{1/2} = 4 + 6 = 10$
$? = 100$

12) b; $? = \sqrt{169 + 7 - 27 + 107}$
$= \sqrt{256} = 16$

13) b; $(0.7)^{?+3} = \frac{(0.7)^8 \quad (0.7)^{12}}{(0.7)^{16}}$
$= (0.7)^4 \Rightarrow ? = 4-3 \Rightarrow ? = 1$

14) c; $\frac{(?)^2}{25} = \frac{45}{100} \quad 45 \quad 100$
$\Rightarrow ? = \pm 225$

15) a; ? = 15.8

16) b; Quantity A:
CP = Rs. 200, SP = Rs. 240
Initial discount percentage = 20%
$\Rightarrow$ MP = Rs. 300
New discount percentage = 30%
$\Rightarrow$ New SP = Rs. 210
$\Rightarrow$ Profit% $= \frac{10}{200} \quad 100 = 5\%$
Quantity B:
The selling price is increased by 20%
$\Rightarrow$ New SP = Rs. 288
$\Rightarrow$ Profit% $= \frac{88}{200} \quad 100 = 44\%$
∴ Quantity B > Quantity A

17) b; A person saves 90 minutes when he increases his speed from 20 km/hr to cover a certain distance.
Let the distance covered be 'd' km
$\Rightarrow$ Time to cover 20 km $= \frac{d}{20}$
$\Rightarrow$ Time to cover 25 km $= \frac{d}{25}$
Difference in time
= 90minutes
$\Rightarrow \frac{d}{20} - \frac{d}{25} = \frac{90}{60}$
$\Rightarrow$ d = 150 km
Quantity B: He covers at a speed of 80 km/hr for 2 hours,
$\Rightarrow$ d = 160 km
∴ Quantity B > Quantity A.

18) b; Quantity A :If the compound interest for 2 years at 20% rate of interest is Rs. 1320
$\Rightarrow CI = P\left(\frac{100+R}{100}\right)^t - P$
$\Rightarrow 1320 = P \quad \frac{11}{25}$
$\Rightarrow P =$ Rs. 3000
Quantity B: The sum of money will produce Rs. 480 interest in 3 years at 4% simple interest
$\Rightarrow SI = P \quad R \quad \frac{T}{100}$
$\Rightarrow P = 480 \quad \frac{100}{12}$
$\Rightarrow P =$ Rs. 4000
∴ Quantity B > Quantity A

19) a; Three years before, the ratio of ages of P and Q was 5 : 6
Three years hence this ratio will become 6 : 7, $\Rightarrow$ 5 : 6 $\Rightarrow$ 6 : 7
$\Rightarrow$ Difference in ratio for P = 1 and difference in years = 6
$\Rightarrow$ 1 = 6 $\Rightarrow$ Present age of P
= 5 × 6 + 3 = 33 years
Quantity B: 10 years before the ratio of ages of P and Q was 1 : 3, 10 years hence the ratio will become 1 : 2 = 2 : 4 $\Rightarrow$ 1 : 3
10 years back $\frac{P}{Q} = \frac{1}{3}$
Hence, 10 years $\frac{P+20}{Q+20} = \frac{1}{2}$
Present age of P = 30
∴ Quantity A > Quantity B