The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

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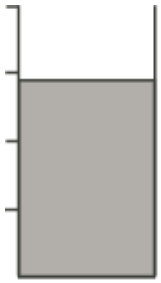
Topic Generator - Problem Set
Problems

1. If 50% of P equals 20% of Q, then P, as a percent of Q, is
   (A) 60% (B) 250% (C) 40% (D) 20% (E) 30%

2. A six-sided die has the numbers one to six on its sides. What is the probability of rolling a five?
   (A) $\frac{2}{6}$ (B) $\frac{1}{6}$ (C) $\frac{5}{6}$ (D) $\frac{3}{6}$ (E) $\frac{4}{6}$

3. A large cylinder can hold 50 L of chocolate milk when full. The tick marks show the division of the cylinder into four parts of equal volume. Which of the following is the best estimate for the volume of chocolate milk in the cylinder as shown?

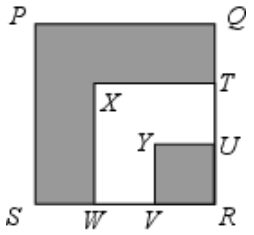


   (A) 24 L (B) 28 L (C) 30 L (D) 36 L (E) 40 L

4. If 50% of N is 16, then 75% of N is
   (A) 12 (B) 6 (C) 20 (D) 24 (E) 40

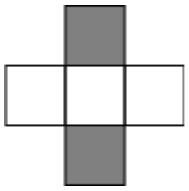
5. One scoop of fish food can feed 8 goldfish. How many goldfish can 4 scoops of fish food feed?
   (A) 12 (B) 16 (C) 8 (D) 64 (E) 32

6. In the diagram, square $PQRS$ is 3×3. Points T and U are on side QR with $QT = TU = UR = 1$. Points V and W are on side RS with $RV = VW = WS = 1$. Line segments TX and UY are perpendicular to QR and line segments VY and WX are perpendicular to RS. The ratio of the shaded area to the unshaded area is



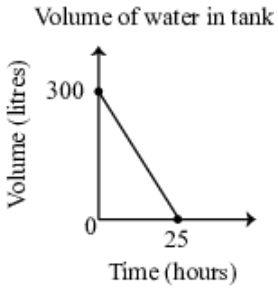
(A) 2 : 1 (B) 7 : 3 (C) 7 : 4 (D) 5 : 4 (E) 3 : 1

7. In the diagram, each of the five squares is 1×1. What percentage of the total area of the five squares is shaded?



(A) 25% (B) 30% (C) 35% (D) 40% (E) 45%

8. The graph shows the volume of water in a 300 L tank as it is being drained at a constant rate. At what rate is the water leaving the tank, in litres per hour?

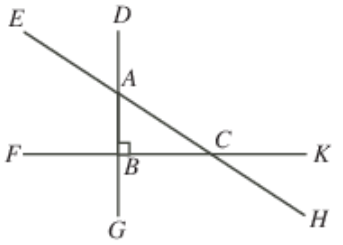


(A) 12 (B) 20 (C) 2.5 (D) 5 (E) 15

9. 50% of n is 2024. The value of n is
(A) 2074 (B) 24 (C) 50 (D) 4048 (E) 4042

10. A theatre has 600 seats. Exactly 25% of these seats are filled. All of the people in the seats then move to an empty theatre that has 200 seats. What percentage of the seats in the smaller theatre are now filled?
(A) 50% (B) 40% (C) 60% (D) 75% (E) 55%

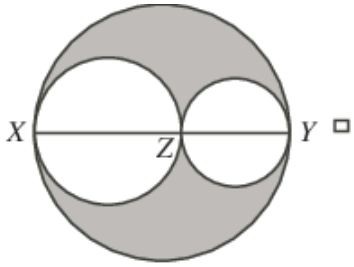
11. In the diagram, $\triangle ABC$ is right-angled. Side AB is extended in each direction to points D and G such that $DA = AB = BG$. Similarly, BC is extended to points F and K so that $FB = BC = CK$, and AC is extended to points E and H so that $EA = AC = CH$. The ratio of the area of the hexagon $DEFGHK$ to the area of $\triangle ABC$ is



(A) 4 : 1 (B) 7 : 1 (C) 9 : 1 (D) 16 : 1 (E) 13 : 1

12. Lorri took a 240 km trip to Waterloo. On her way there, her average speed was 120 km/h. She was stopped for speeding, so on her way home her average speed was 80 km/h. What was her average speed, in km/h, for the entire round-trip?
(A) 90 (B) 96 (C) 108 (D) 102 (E) 110

13. In the diagram, Z lies on XY and the three circles have diameters XZ, ZY and XY. If $XZ = 12$ and $ZY = 8$, then the ratio of the area of the shaded region to the area of the unshaded region is



(A) 12 : 25 (B) 12 : 13 (C) 1 : 1 (D) 1 : 2 (E) 2 : 3

14. The number of odd integers between $\frac{17}{4}$ and $\frac{35}{2}$ is
(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

15. If snow falls at a rate of 1 mm every 6 minutes, then how many *hours* will it take for 1 m of snow to fall?
(A) 33 (B) 60 (C) 26 (D) 10 (E) 100

16. The ratio of junior kindergarteners to senior kindergarteners at Gauss Public School is 8 : 5. If there are 128 junior kindergarteners at the school, then how many kindergarteners are there at the school?
(A) 218 (B) 253 (C) 208 (D) 133 (E) 198

17. On Monday, Ramya read $\frac{1}{5}$ of a 300 page novel. On Tuesday, she read $\frac{4}{15}$ of the remaining pages. How many pages did she read in total on Monday and Tuesday?
(A) 124 (B) 60 (C) 252 (D) 80 (E) 64

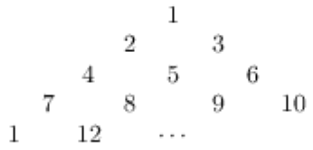
18. Christina and Frieda want to buy the same book. Christina has $\frac{3}{4}$ of the money needed to buy the book and Frieda has half of the money needed to buy the book. If the book was \$3 cheaper, then together they would have exactly enough money to buy 2 copies of the book. What is the original price of the book?
(A) \$4 (B) \$16 (C) \$12 (D) \$10 (E) \$8

19. Brodie and Ryan are driving directly towards each other. Brodie is driving at a constant speed of 50 km/h. Ryan is driving at a constant speed of 40 km/h. If they are 120 km apart, how long will it take before they meet?
(A) 1 h 12 min (B) 1 h 25 min (C) 1 h 15 min (D) 1 h 33 min (E) 1 h 20 min

20. Car X and Car Y are travelling in the same direction in two different lanes on a long straight highway. Car X is travelling at a constant speed of 90 km/h and has a length of 5 m. Car Y is travelling at a constant speed of 91 km/h and has a length of 6 m. Car Y starts behind Car X and eventually passes Car X. The length of time between the instant when the front of Car Y is lined up with the back of Car X and the instant when the back of Car Y is lined up with the front of Car X is t seconds. The value of t is
(A) 39.6 (B) 18.0 (C) 21.6 (D) 46.8 (E) 32.4

21. Dolly, Molly and Polly each can walk at 6 km/h. Their one motorcycle, which travels at 90 km/h, can accommodate at most two of them at once (and cannot drive by itself!). Let t hours be the time taken for all three of them to reach a point 135 km away. Ignoring the time required to start, stop or change directions, what is true about the smallest possible value of t?
(A) $t < 3.9$ (B) $3.9 \leq t < 4.1$ (C) $4.1 \leq t < 4.3$ (D) $4.3 \leq t < 4.5$
(E) $t \geq 4.5$

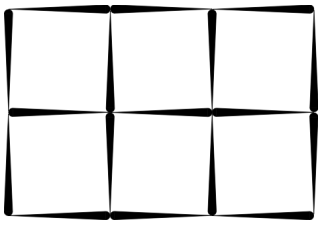
22. The positive integers are arranged in increasing order in a triangle, as shown. Each row contains one more number than the previous row. The sum of the numbers in the row that contains the number 400 is



(A) 10 990 (B) 12 209 (C) 9855 (D) 10 976 (E) 11 368

23. Angie has a jar that contains 2 red marbles, 2 blue marbles, and no other marbles. She randomly draws 2 marbles from the jar. If the marbles are the same colour, she discards one and puts the other back into the jar. If the marbles are different colours, she discards the red marble and puts the blue marble back into the jar. She repeats this process a total of three times. What is the probability that the remaining marble is red?
(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$ (E) 0

24. In the diagram, 17 toothpicks are used to make a 2 by 3 grid of squares.



Of the toothpicks used, 10 are outer toothpicks and 7 are inner toothpicks. Suppose that toothpicks are used to make a 20 by 24 grid of squares. To the nearest percent, what percentage of toothpicks used are inner toothpicks?
(A) 88% (B) 95% (C) 93% (D) 70% (E) 91%

25. When two ants work together they can build an anthill in 24 minutes. When the bigger ant works alone, an anthill can be built in 14 minutes less than when the smaller ant works alone. How many minutes does it take the smaller ant to build an anthill when working alone?