

SOLUTIONS: Stage I Question Set 13

Solution to Question #1:

$$\frac{\frac{1}{3} + \frac{1}{6}}{\frac{1}{2}} = \frac{3/6}{1/2} = 1$$

The correct answer is (c) .

Solution to Question #2:

$$x + 3 = 6(2) = 12$$

$$x = 9$$

The correct answer is (d) .

Solution to Question #3:

$$15 = 5 \times 3$$

$$25 = 5 \times 5$$

The least common multiple will be $5 \times 5 \times 3 = 75$

The correct answer is (e) .

Solution to Question #4:

$$0.724 = 724/1000 = 181/250$$

$$1.724 = 1\frac{181}{250}$$

The correct answer is (e) .

Solution to Question #5:

$$2\alpha - 3\beta + 4\alpha + 5\beta = 6\alpha + 2\beta = 6(3) + 2(4) = 26$$

The correct answer is (a) .

Solution to Question #6:

Rachel travels $(15 - 25 + 12)$ km = 2 km East

Rachel travels $(17 - 8)$ km = 9 km North

To get back to her starting point, Rachel must travel 2 km West and 9 km South.

a) 12 km East, 9 km South, 14 km West

This is the same as 2 km West and 9 km South, so this is true.

b) 9 km North and 2 km East

False.

c) 9 km South and 2 km West

True.

d) a & b

False, since (b) is false.

e) a & c

True, since a) and c) are true.

The correct answer is (e) .

Solution to Question #7:

The surface area of the $2 \times 2 \times 2$ cube is $6(2 \times 2) = 24$

The surface area of the $4 \times 4 \times 4$ cube is $6(4 \times 4) = 96$

The ratio is $24/96 = 1/4$

The correct answer is **(a)** .

Solution to Question #8:

$$AD = 36 - 12 = 24$$

$$BC = 24/8 = 3$$

Since B is at 17, C must be at $(17 + 3 = 20)$.

The correct answer is **(b)** .

Solution to Question #9:

a) $2n + 2$

This is false if $n = 2$ (or for any even value of n).

b) $4n + 4$

True.

c) $3n + 1$

False for any even value of n .

d) $6n - 2$

False for any even value of n .

e) none of the above

False, since b is true.

The correct answer is **(b)** .

Solution to Question #10:

$$x^3 + x^4 - x - x^2 = \frac{1}{8} + \frac{1}{16} - \frac{1}{2} - \frac{1}{4} = \frac{3}{16} - \frac{3}{4} = \frac{3}{16} - \frac{12}{16} = \frac{-9}{16}$$

The correct answer is **(e)** .

Solution to Question #11:

The diagonal of the path is $7\sqrt{2}$. $CB = 7$. $BI = 5$, since it is the diagonal of a 3-4-5 triangle. The length of the path is $7\sqrt{2} + 12$.

The correct answer is **(d)** .

Solution to Question #12:

T = the total amount of gasohol

$$2 = 0.1T$$

$$T = 20 \text{ L}$$

The correct answer is **(e)** .

Solution to Question #13:

The height $EF = 15$. The base $EB = 15(3/5) = 9$.

The area of the rectangle $EFCB = 9 \times 15 = 135 \text{ m}^2$.

The correct answer is **(e)** .

Solution to Question #14:

The semicircle has an area of $\frac{1}{2}\pi(4)(4) = 8\pi$

The rectangle has an area of $8 \times 1 = 8$.

The total area is $8\pi + 8$.

The area of the triangle is $\frac{1}{2}(1)(8) = 4$.

The ratio = $4 \div (8\pi + 8)$ approximately equals 12%.

The correct answer is **(d)** .

Solution to Question #15:

$$180(0.95) = 171 \text{ cm.}$$

Matilda must grow $(171 - 158) = 13 \text{ cm}$ in order to be 95% as tall as Niles.

The correct answer is (c) .

Solution to Question #16:

$$4B = 8, \text{ so } B = 2$$

$$2A + 2B = 14 = 2A + 4, \text{ so } A = 5$$

$$2B + A + C = 2(2) + 5 + C = 9 + C = 12, \text{ so } C = 3$$

$$2B + 2D = 2(2) + 2D = 20, \text{ so } D = 8$$

$$T = 2D + A + C = 2(8) + 5 + 3 = 24$$

The correct answer is (b) .

Solution to Question #17:

$$\text{The white area} = (1 \times 1) + (4 \times 1) + (4 \times 1) = 9$$

$$\text{The red area} = 25 - [4 \times 1 + (1 \times 1) + (1 \times 1)] = 19$$

The ratio of the white area to the red area is $9/19$.

The correct answer is (c) .

Solution to Question #18:

The trip took $800/50 = 16$ hours for the first 800 miles.

The trip took $400/40 = 10$ hours for the next 400 miles.

The total time taken was 26 hours for the 1200 miles.

If the group had averaged 60 miles per hour, they would have taken $1200/60 = 20$ hours.

Pierre would have arrived 6 hours sooner.

The correct answer is (c) .

Solution to Question #19:

The time is between 10 and 11.

$3/5$ of the hour between 10 and 11 has elapsed.

$$60(3/5) = 36 \text{ minutes.}$$

The exact time is 10:36.

The correct answer is (d) .

Solution to Question #20:

The orange drink has $0.25(2) = 0.5$ L of juice in it.

The orange soda has $(0.1)(2) = 0.2$ L of juice in it.

The difference in the amount of juice is 0.3L.

The correct answer is (b) .