

## **SAT SAT-Mathematics Exam**

**Volume: 161 Questions**

Question No: 1

Rob has six songs on his portable music player. How many different four-song orderings can Rob create?

- A. 30
- B. 60
- C. 120
- D. 360
- E. 720

Correct Answer: D

Explanation/Reference:

The order of the four songs is important. The orderings A, B, C, D and A, C, B, D contain the same four songs, but in different orders. Both orderings must be counted. The number of six-choose-four orderings is equal to  $(6)(5)(4)(3) = 360$ .

Question No: 2

The statement "Raphael runs every Sunday" is always true. Which of the following statements is also true?

- A. If Raphael does not run, then it is not Sunday.
- B. If Raphael runs, then it is Sunday.
- C. If it is not Sunday, then Raphael does not run.
- D. If it is Sunday, then Raphael does not run.
- E. If it is Sunday, it is impossible to determine if Raphael runs.

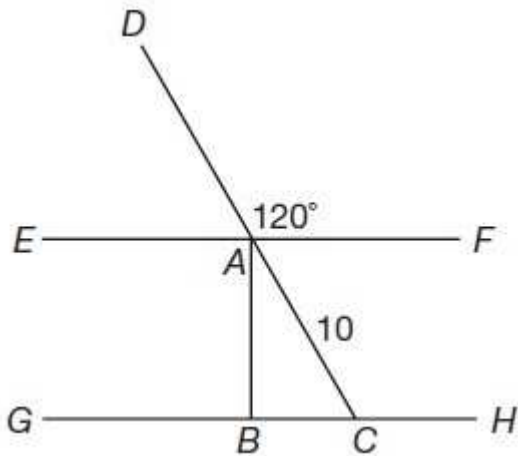
Correct Answer: A

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Explanation/Reference:

The statement "Raphael runs every Sunday" is equivalent to "If it is Sunday, Raphael runs." The contrapositive of a true statement is also true. The contrapositive of "If it is Sunday, Raphael runs" is "If Raphael does not run, it is not Sunday."

Question No: 3



In the diagram above, lines EF and GH are parallel, and line AB is perpendicular to lines EF and GH. What is the length of line AB?

- A. 5
- B. 52
- C. 53
- D. 102
- E. 103

Correct Answer: C

Explanation/Reference:

Line AB is perpendicular to line BC, which makes triangle ABC a right triangle. Angles DAF and DCH are alternating angles--angles made by a pair of parallel lines cut by a transversal. Angle DAF angle DCH, therefore, angle DCH = 120 degrees. Angles DCH and ACB form a line. There are 180 degrees in a line, so the measure of angle ACB =  $180 - 120 = 60$  degrees. Triangle ABC is a 30-60-90 right triangle, which means that the length of the hypotenuse, AC, is equal to twice the length of the leg opposite the 30-degree angle, BC. Therefore, the length of BC is  $10/2$ , or 5. The length of the leg opposite the 60-

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degree angle, AB, is 3 times the length of the other leg, BC. Therefore, the length of AB is.

Question No: 4

The expression is equivalent to

$$\frac{(x^2 + 2x - 15)}{(x^2 + 4x - 21)}$$

A.  $\frac{5}{7}$

B.  $\frac{x+5}{x+7}$

C.  $\frac{x+5}{2x-7}$

D.  $\frac{-5}{4x-21}$

E.  $2x-15$

A. Option A

B. Option B

C. Option C

D. Option D

E. Option E

Correct Answer: C

Explanation/Reference:

Factor the numerator and denominator and cancel like factors:

$$x^2 + 2x - 15 = (x + 5)(x - 3)$$

$$x^2 + 4x - 21 = (x + 7)(x - 3)$$

Cancel the (x - 3) term from the numerator and the denominator. The fraction reduces to

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$$\begin{array}{l} x+7 \\ x+5\frac{1}{2} \end{array}$$

Question No: 5

The point (2, 1) is the midpoint of a line with endpoints at (5,3) and

- A. (3,4)
- B. (7,2)
- C. (7,1)
- D. (9,1)
- E. (10, 3)

Correct Answer: D

Explanation/Reference:

The midpoint of a line is equal to the average x-coordinates and the average y-coordinates of the line's endpoints:

$$\frac{-5+x}{2}=2, \quad -5+x=4, \quad x=9$$

$$\frac{3+y}{2}=1, \quad 3+y=2, \quad y=-1$$

The other endpoint of this line is at (9,-1).

Question No: 6

Lindsay grows only roses and tulips in her garden. The ratio of roses to tulips in her garden is 5:6. If there are 242 total flowers in her garden, how many of them are tulips?

- A. 22
- B. 40
- C. 110

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D. 121

E. 132

Correct Answer: E

Explanation/Reference:

The number of roses,  $5x$ , plus the number of tulips,  $6x$ , is equal to 242 total flowers:  $5x + 6x = 242$ ,  $11x = 242$ ,  $x = 22$ . There are  $5(22) = 110$  roses and  $6(22) = 132$  tulips in Lindsay's garden.

Question No: 7

It takes eight people 12 hours to clean an office. How long would it take six people to clean the office?

A. 9 hours

B. 15 hours

C. 16 hours

D. 18 hours

E. 24 hours

Correct Answer: C

Explanation/Reference:

There is an inverse relationship between the number of people and the time needed to clean the office. Multiply the number of people by the hours needed to clean the office:  $(8)(12) = 96$ . Divide the total number of hours by the new number of people,  $= 16$ . It takes six people 16 hours to clean the

$6: \frac{96}{6}$  office.

Question No: 8

Greg has nine paintings. The Hickory Museum has enough space to display three of them. From how many different sets of three paintings does Greg have to choose?

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- A. 27
- B. 56
- C. 84
- D. 168
- E. 504

Correct Answer: C

Explanation/Reference:

Be careful not to count the same set of three paintings more than once--order is not important. A nine-choose-three combination is equal to

$$\frac{{9 \choose 3} = \frac{9!}{3!6!} = \frac{9 \cdot 8 \cdot 7}{6} = 84$$

Question No: 9

If the surface area of a cube is 384 cm<sup>2</sup>, what is the volume of the cube?

- A. 64 cm<sup>3</sup>
- B. 256 cm<sup>3</sup>
- C. 512 cm<sup>3</sup>
- D. 1,152 cm<sup>3</sup>
- E. 4,096 cm<sup>3</sup>

Correct Answer: C

Explanation/Reference:

The surface area of a cube is equal to 6e<sup>2</sup>, where e is the length of one edge of the cube; 6e<sup>2</sup>= 384 cm<sup>2</sup>, e<sup>2</sup>= 64, e = 8 cm. The volume of a cube is equal to e<sup>3</sup>; (8 cm)<sup>3</sup>= 512 cm<sup>3</sup>.

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Question No: 10

What is the next number in the series below?

3 16 6 12 12 8

- A. 4
- B. 15
- C. 20
- D. 24
- E. 32

Correct Answer: D

Explanation/Reference:

This series actually has two alternating sets of numbers. The first number is doubled, giving the third number. The second number has 4 subtracted from it, giving it the fourth number. Therefore, the blank space will be 12 doubled, or 24.

Question No: 11

The volume of a glass of water placed in the sun decreases by 20%. If there are 240 mL of water in the glass now, what was the original volume of water in the glass?

- A. 192ml
- B. 260ml
- C. 288ml
- D. 300ml
- E. 360ml

Correct Answer: D

Explanation/Reference:

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The original volume of water,  $x$ , minus 20% of  $x$ ,  $0.20x$ , is equal to the current volume of water, 240ml:

$$x - 0.20x = 240 \text{ ml}$$

$$0.8x = 240 \text{ ml}$$

$$x = 300 \text{ ml}$$

Question No: 12

What is the tenth term of the pattern below?

$$\frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \frac{16}{81}, \dots$$

A.  $\frac{20}{30}$

B.  $\frac{2^{10}}{3}$

C.  $\frac{2}{3^{10}}$

D.  $\left(\frac{2}{3}\right)^{10}$

E.  $\left(\frac{2}{3}\right)^{10}$

A. Option A

B. Option B

C. Option C

D. Option D

E. Option E

Correct Answer: E

Explanation/Reference:

Each term in the pattern is equal to the fraction  $\frac{2}{3}$  raised to an exponent that is equal to the position of the term in the sequence. The first term in the sequence is equal to  $\left(\frac{2}{3}\right)^1$ , the second term is equal to  $\left(\frac{2}{3}\right)^2$ , the third term is equal to  $\left(\frac{2}{3}\right)^3$ , and so on.



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$\left(\frac{2}{3}\right)^1$ , and so on. Therefore, the tenth term in the sequence will be equal to

$$\left(\frac{2}{3}\right)^2$$

Question No: 13

How does the area of a rectangle change if both the base and the height of the original rectangle are tripled?

- A. The area is tripled.
- B. The area is six times larger.
- C. The area is nine times larger.
- D. The area remains the same.
- E. The area cannot be determined.

Correct Answer: C

Explanation/Reference:

Since both dimensions are tripled, there are two additional factors of 3. Therefore, the new area is  $3 \times 3$

$\times = 9$  times as large as the original. For example, use a rectangle with a base of 5 and height of 6. The area is  $5 \times 6 = 30$  square units. If you multiply the each side length by 3, the new dimensions are 15

$\times$  and 18. The new area is  $15 \times 18$ , which is 270 square units. By comparing the new area with the  $\times$  original area, 270 square units is nine times larger than 30 square units;  $30 \times 9 = 270$ .  $\times$

Question No: 14

The equation is undefined when

$$y = \frac{x+6}{x^2+7x-18}$$

- A. 9.

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- B. 2.
- C. 6.
- D. 0.
- E. 9.

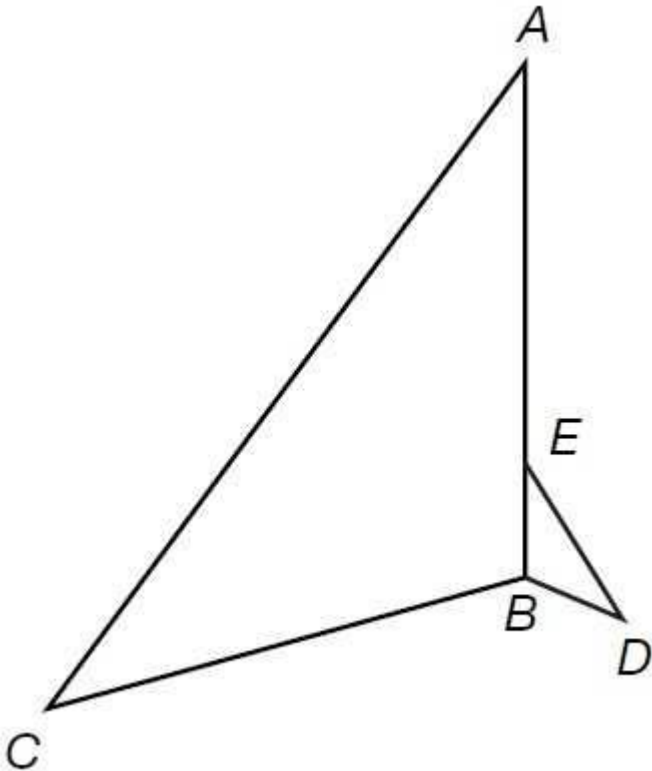
Correct Answer: A

Explanation/Reference:

An equation is undefined when the value of a denominator in the equation is equal to zero. Set  $x^2 + 7x + 18$  equal to zero and factor the quadratic to find its roots:

$$\begin{aligned}x^2 + 7x + 18 &= 0 \\(x + 9)(x + 2) &= 0 \\x &= -9, x = -2\end{aligned}$$

Question No: 15



In the diagram above, angle A is congruent to angle BED, and angle C is congruent to angle D. If the ratio