Time—20 Minutes
16 Questions

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding oval on the answer sheet. You may use any available space for scratchwork.

Notes

1. Calculator use is permitted.
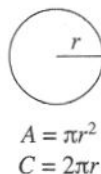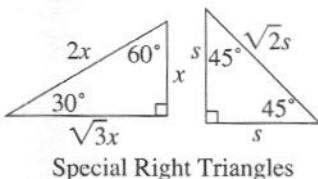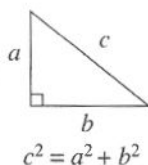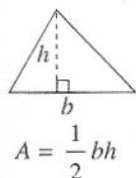
2. All numbers used are real numbers.

3. Figures are provided for some problems. All figures are drawn to scale and lie in a plane UNLESS otherwise indicated.

4. Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

Reference Information

$A = \dfrac{1}{2}bh$ $c^2 = a^2 + b^2$ Special Right Triangles $A = \pi r^2$ $C = 2\pi r$ $V = \ell wh$ $V = \pi r^2 h$ $A = \ell w$
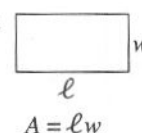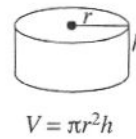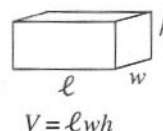
The sum of the measures in degrees of the angles of a triangle is 180.
The number of degrees of arc in a circle is 360.
A straight angle has a degree measure of 180.

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1 If $7.708 < x < 7.8$, which of the following could be the value of x?

(A) 7.808
(B) 7.907
(C) 7.75
(D) 7.07
(E) 7.88

2 If P, Q, R, and S are four points on a line such that Q is between P and R, and S is between Q and R, then it must also be true that

(A) Q is between P and S
(B) R is between Q and S
(C) S is between P and Q
(D) P is between S and R
(E) P is between Q and R
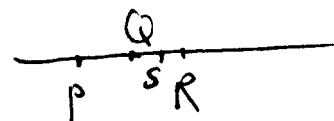
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3 If $7n + 4 = 10n - 8$, then what is the value of $4n$?

(A)   1
(B)   4
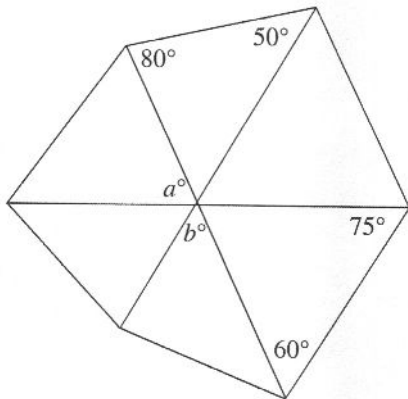(C)   6
(D) 12
(E) 16

$$7n + 4 = 10n - 8$$

$$12 = 3n$$

$$4 = n$$

$$16 = 4n$$

5 A certain printer takes 4 minutes to print file A and 5 minutes to print file B. In one hour, how many more copies of file A can be printed than of file B?

(A) 12
(B)   9
(C)   6
(D)   4
(E)   3

4 In the hexagon above, three diagonals intersect at a point. What is the value of $a + b$?

(A)   90
(B)   95
(C) 100
(D) 105
(E) 110

6 If $|1 - x| \geq 1$, then x could be any of the following EXCEPT:

(A) −2
(B) −1
(C)   0
(D)   1
(E)   2

$$1 - x \geq 1 \qquad -(1-x) \geq 1$$

$$-x \geq 0 \qquad 1 - x \leq -1$$

$$x \leq 0 \qquad -x \leq -2$$

$$x \geq 2$$

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7 If a bowl contains r red marbles and b blue marbles and no other marbles, what is the ratio of the number of red marbles to the total number of marbles in the bowl?

(A) r to b
(B) b to r
(C) r to rb
(D) b to $(r + b)$
(E) r to $(r + b)$

8 If 175 percent of x is 140, what is x percent of 40?

(A)   30
(B)   32
(C)   42
(D)   98
(E)   100

$1.75 \cdot X = 140$

$X = \dfrac{140}{1.75} = 80$

$80\% \text{ of } 40$

$= 8 \times 40 = 32$

9 If X is the set of positive integers with exactly one prime factor and Y is the set of integers from 1 to 50 inclusive, then the intersection of X and Y contains how many elements?

(A) 15
(B) 16
(C) 21
(D) 23
(E) 24

$X = \{1, 2, 3, 5, 7, 11, 13, 17, 19$
$23, 29, 31, 37, 41, 43,$
$47, 2^2, 2^3, 2^4, 2^5$
$3^2, 3^3, 5^2, 7^2\}$

$Y = \{1, 2, \cdots - 50\}, X \cap Y = X$

$X \cap Y = \{1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31$
$37, 41, 43, 47, 8, 16, 32, 9, 27$
$25, 49\}$

10 On a map, $\frac{1}{2}$ inch represents 32 feet. If a certain trail is 256 feet long, what is its length, in inches, on the map?

(A) $\dfrac{1}{16}$
(B) $\dfrac{1}{4}$
(C) $\dfrac{3}{8}$
(D) 4
(E) 16

$256 \div \frac{1}{32} = 256 \times 32$

$= 8 \text{ Half Inches}$

$= 8 \times \frac{1}{2} = 4''$

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11 If p and q are integers greater than 1, then p^{12} must be greater than q^{48} when p is equal to which of the following?

(A) q^5
(B) q^4
(C) $5q$
(D) $4q$
(E) $q + 37$

$$p^{12} > q^{48}$$

$$p^{12} > (q^4)^{12}$$

$$p > q^4$$

$$\Rightarrow p = q^5$$

12 A set consists of all the positive three-digit integers with the property that each digit is either a 1 or a 2. For how many of these three-digit elements of the set is the average of the units, tens, and the hundreds digit an integer?

(A) 4
(B) 3
(C) 2
(D) 1
(E) 0

13 A certain population of bacteria triples every 3 minutes. If the number of bacteria in the population initially was 3^{10}, what was the number in the population one half-hour later?
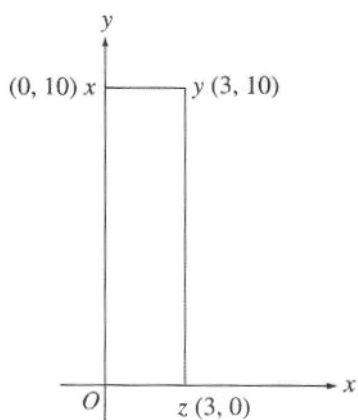
(A) 3^{11}
(B) $10(3^{10})$
(C) $(10^3)(3^{10})$
(D) 3^{20}
(E) 3^{100}

14 An integer n is to be chosen at random from a set of 12 consecutive positive integers. Which of the following must be less than $\frac{1}{2}$?

   I. The probability that n is the median of the set
   II. The probability that n is odd
   III. The probability that n is a multiple of 3

(A) I only
(B) II only
(C) III only
(D) I and III only
(E) I, II, and III

(0, 10) x ┌──────┐ y (3, 10)

O   z (3, 0)

15 What is the area of rectangle *OXYZ* in the figure above?

(A)   9
(B)   13
(C)   15
(D)   30
(E)   100

Area = Legth · Width
= 10 × 3 = 30

16 Line *l* has an equation of $y = 4x + 5$. If line *m* is parallel to line *l* and passes through the point (2, 6), what is the *y*-intercept of line *m*?

(A) −14
(B)   −8
(C)   −2
(D)   2
(E)   5

↑↑ => M = 4

Y = MX + b

6 = 4 × 2 + b

6 = 8 + b

6 − 8 = b

|b = −2|

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST. **STOP**

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