

WS 3—Skills 6-10

Directions: For this section, solve each problem and decide which is the best of the choices given. Circle the corresponding capital letter. You may use any available space for scratchwork.

Notes:

1. The use of a calculator is permitted.
2. All numbers used are real numbers.
3. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures 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.

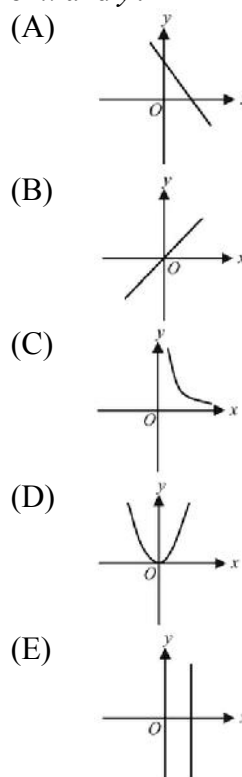
1. If a man can drive from his home to New Braunfels in 5 hours at 45 miles per hour, how long would it take him if he drove at 50 mph?
(A) 4 hours
(B) 4 hours 30 minutes
(C) 5 hours
(D) 5 hours 30 minutes
(E) 6 hours

x	y
2	25
4	a
5	10
8	b

2. In the table above, y varies inversely with x . What is the value of $a + b$?
(A) 16
(B) 18
(C) 18.75
(D) 20.25
(E) 23.75
3. If a job can be completed by 2 workers in 10 days, then what is the number of workers needed to complete the job in 5 days?
(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

4. The length of a rectangle varies inversely to the width. If the length is 10 when the width is 20, what is the length when the width is 40?
(A) 2
(B) 5
(C) 10
(D) 20
(E) 40

5. If x and y are inversely proportional, which of the following graphs describes the relationship of x and y ?

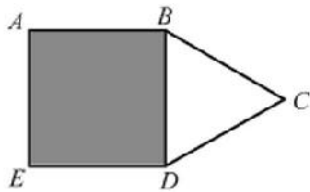


6. A certain job can be completed by p persons in h hours. How long would it take n persons, working at the same rate, to complete the same job?

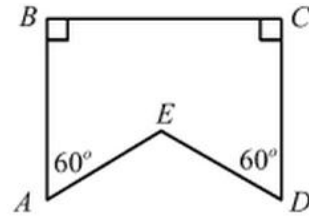
(A) $\frac{hn}{p}$
 (B) $\frac{h}{hp}$
 (C) $\frac{hp}{n}$
 (D) $\frac{np}{h}$
 (E) $\frac{h}{np}$

7. If it takes 5 people d days to install the plumbing for a house, then how many days would it take two people to complete one-third of the same job?

(A) $d + 1$
 (B) $\frac{3d}{2}$
 (C) $2d$
 (D) $\frac{5d}{2}$
 (E) $\frac{5d}{6}$

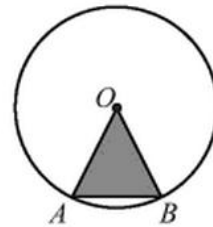


8. In the figure above, $ABDE$ is a square and $\triangle BCD$ is an equilateral triangle. If the area of $\triangle BCD$ is $16\sqrt{3}$, what is the area of the square?
- (A) 32
 (B) $32\sqrt{3}$
 (C) 64
 (D) $64\sqrt{2}$
 (E) 72

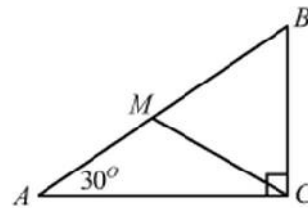


Note: Figure not drawn to scale.

9. In the figure above, $AB = BC = CD = 10$ and $AE = ED$. What is the perimeter of the figure?
- (A) 40
 (B) 50
 (C) $30 + 10\sqrt{3}$
 (D) $30 + 20\sqrt{3}$
 (E) $30 + \frac{20\sqrt{3}}{3}$



10. In the figure above, the radius of circle O is 8 and $\angle AOB = 60^\circ$. What is the area of $\triangle AOB$?
- (A) $8\sqrt{3}$
 (B) $10\sqrt{3}$
 (C) $12\sqrt{2}$
 (D) $15\sqrt{2}$
 (E) $16\sqrt{3}$



11. In the figure above, M is the midpoint of \overline{AB} , $AM = MC$, and the length of \overline{MC} is 20. What is the area of $\triangle ABC$?
- (A) 200
 (B) $100\sqrt{2}$
 (C) $100\sqrt{3}$
 (D) $200\sqrt{2}$
 (E) $200\sqrt{3}$

12. If $\{(-2)^3 \cdot 8^2\}^4 = (2^4)^n$, what is the positive value of n ?
- (A) 6
(B) 7
(C) 8
(D) 9
(E) 10

13. If $4^3 + 4^3 + 4^3 + 4^3 = 2^n$, what is the value of n ?
- (A) 2
(B) 4
(C) 6
(D) 8
(E) 10

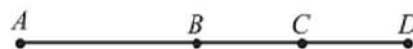
14. If m and n are positive and $5m^5n^{-3} = 20m^3n$, what is the value of m in terms of n ?
- (A) $\frac{1}{4n}$
(B) $\frac{4}{n^2}$
(C) $\frac{4}{n^3}$
(D) $2n^2$
(E) $4n^2$

15. If a and b are positive integers, $(a^{-4}b)^{-1} = 16$, and $b = a^2$, which of the following could be the value of a ?
- (A) 0
(B) 2
(C) 4
(D) 8
(E) 12

16. If $k^{-2} \times 2^3 = 2^7$, what is the value of k ?
- (A) 2
(B) 4
(C) 8
(D) $\frac{1}{4}$
(E) $\frac{1}{8}$

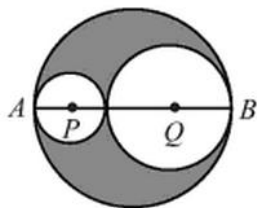
17. If p and q are positive integers, $p^{-3} = 2^{-6}$ and $q^2 = 4^2$, what is the value of pq ?
- (A) 1
(B) 2
(C) 3
(D) 4
(E) 5

18. If a and b are positive integers and $(a^6b^4)^{\frac{1}{2}} = 675$, what is the value of $a + b$?
- (A) 3
(B) 4
(C) 5
(D) 7
(E) 8

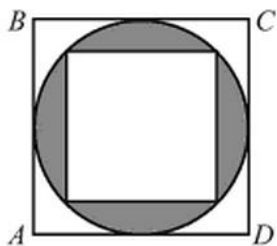


Note: Figure not drawn to scale.

19. In the figure above, B is the midpoint of \overline{AD} and $\frac{BC}{CD} = \frac{2}{3}$. If a point will be chosen at random along the line segment, what is the probability that the point will be chosen from \overline{BC} ?
- (A) $\frac{1}{5}$
(B) $\frac{2}{5}$
(C) $\frac{1}{3}$
(D) $\frac{2}{3}$
(E) $\frac{3}{5}$

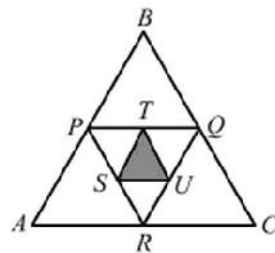


20. In the figure above, the radius of the circle P is 2, the radius of the circle Q is 4, and AB is the diameter of the largest circle. If a dart is thrown at the circular target and is equally likely to hit any point on the target, what is the probability that the dart will hit the shaded region?



21. In the figure above, a circle is inside of and outside of a square. If a point is chosen at random from the square $ABCD$, what is the probability that the point is chosen from the shaded region?

- (A) $\frac{1}{4}$
 (B) $\frac{\pi - 50}{100}$
 (C) $\frac{2\pi - 50}{100}$
 (D) $\frac{\pi - 2}{8}$
 (E) $\frac{\pi - 2}{4}$



22. In the figure above, $\triangle ABC$, $\triangle PQR$, and $\triangle STU$ are equilateral triangles, and P , Q , R , S , T , and U are midpoints of \overline{AB} , \overline{BC} , \overline{CA} , \overline{PR} , \overline{PQ} , and \overline{QR} respectively. If a point is chosen at random from $\triangle ABC$, what is the probability that the point is chosen from the shaded region?

- (A) $\frac{1}{32}$
 (B) $\frac{1}{24}$
 (C) $\frac{1}{18}$
 (D) $\frac{1}{16}$
 (E) $\frac{1}{12}$

23. If a function f is given by $f(x) = \frac{\sqrt{x}}{x-3}$, which of the following represents its domain?

- (A) $x \geq 0$
 (B) $x \neq 3$
 (C) $x \geq 3$
 (D) $x \geq 0$ and $x \neq 3$
 (E) all real x

24. If a function is given by $g(x) = \sqrt{x-2} - 5$, which of the following represents its range?

- (A) $y \geq 0$
 (B) $y \geq 2$
 (C) $y \geq 5$
 (D) $y \geq -5$
 (E) $y \leq -5$

Problem Number	Correct Answer	Skill Number
1	B	6
2	C	6
3	D	6
4	B	6
5	C	6
6	C	6
7	E	6
8	C	7
9	E	7
10	E	7
11	E	7
12	D	8
13	D	8
14	D	8
15	C	8
16	D	8
17	A	8
18	E	8
19	A	9
20	C	9
21	E	9
22	D	9
23	D	10
24	D	10