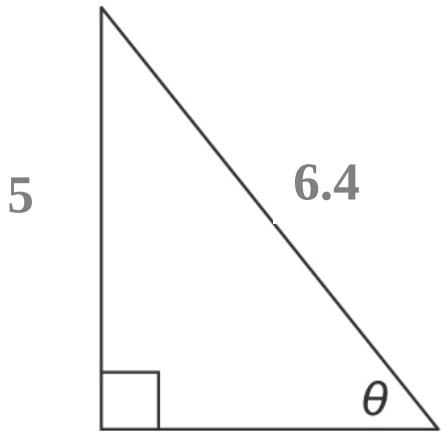
Name_____ **Date**_____

SAT-Prep Questions (Part 1)

Circle the correct answer.

1. What is the measure of θ? (Approximate value)



(A) 50.6°

(B) 52.6°

(C) 51°

(D) 51.4°

(E) 48.6°

2. What is the value of arcsin ($\frac{\sqrt{3}}{2}$)?

(A) $\frac{2\pi}{3}$

(B) $\frac{\pi}{5}$

(C) 1

(D) $\frac{6\pi}{7}$

(E) $\frac{\pi}{3}$

3. A bag of coins contains 4 quarters, 6 dimes and 2 pennies.

What is the probability of drawing a dime and then a quarter, without replacing coins?

(A) $\frac{2}{11}$

(B) $\frac{4}{13}$

(C) $\frac{3}{17}$

(D) $\frac{1}{2}$

(E) $\frac{1}{3}$

4. In a coordinate plane, line *a* passes through the points (0,0) and (2,5). Line *b* is perpendicular to line l. What is the slope of line *b*?

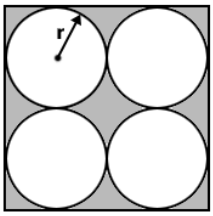
(A) $-\frac{5}{2}$

(B) $-\frac{2}{5}$

(C) $\frac{2}{5}$

(D) $\frac{5}{2}$

(E) **5**



5.

All circles are tangent to each other and to the polygon shown. All circles shown are the same size. The shaded area is:

(A) $4r^2 - \pi r^2$

(B) $8r^2 - 2\pi r^2$

(C) $16r^2 - 4\pi r^2$

(D) $16r^2 - 2\pi r^2$

(E) $32r^2 - 4\pi r^2$

6. 8, a, 14, b, 20,…

The first term of the sequence above is 8. Which of the following could be the formula for finding the nth term of this sequence for any positive integer n?

(A) 2n + 6

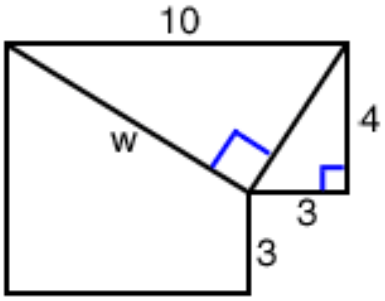
(B) 3n + 5

(C) 5n + 3

(D) 6n + 2

(E) 6n + 5

7.



What is the length of w?

(A) 5

(B) 7

(C) 8

(D) $\sqrt{75}$

(E) $\sqrt{80}$

8. If |a| - |b| = 5; which of the following could be true?

(A) a = 0

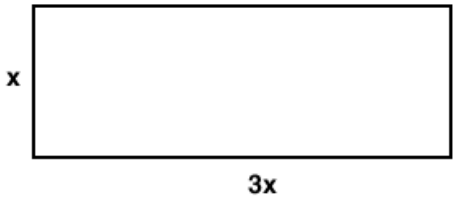
(B) b = 0

(C) a = b

(D) a = -b

(E) a = 1

9.



What is the perimeter divided by the area, expressed as a function of x?

(A) 2.67x

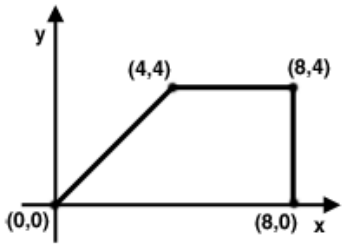
(B) $0.375x^{-1}$

(C) $2.67x^{2}$

(D) 0.375x

(E) $2.67x^{-1}$

10.



What is the area of the polygon?

(A) 8

(B) 16

(C) 20

(D) 24

(E) 32

11. All people in an election voted for either Bob or Fred. Bob received 58 more percentage points of the vote than Fred. What percentage of the voting public voted for Fred?

(A) 21

(B) 22

(C) 23

(D) 24

(E) 25

12. If x and y are odd positive integers, which of the following must be even?

I. $x + y$

II. $x^{(y+1)}$

III. $x(y + 1)$

(A) I only

(B) II only

(C) I and III

(D) II and III

(E) I, II, and III

13. In the xy plane, line m passes through the points (a,0)and (0,2a), where a>1. What is the slope of line m?

(A) -2

(B) $-\frac{1}{2}$

(C) 2

(D) -2a

(E) 2a

14.

The geometric mean of three numbers, a, b, c, is defined as: $(abc)^{1/3}$

Which of the following has the highest geometric mean?

(A) (2, 4, 6)

(B) (0, 6, 8)

(C) (1, 4, 7)

(D) (2, 3, 6)

(E) (0, 6, 9)

15. If S is the set of positive integers that are multiples of 7, and T is the set of positive integers that are multiples of 13, how many integers are in the intersection of S and T?

(A) None

(B) One

(C) Seven

(D) Thirteen

(E) More than thirteen

16. Simplify: For all x > 0, $\frac{2x^2+14x+24}{x+4}$

(A) x + 3

(B) x + 4

(C) 2(x + 3)

(D) 2(x + 4)

(E) 2(x + 3)(x + 4)

17. $8s + 2t = x$

$t + 4s = -1$

If there are an infinite number of real-valued solutions for s and t, what is the value of x?

(A) -2

(B) -1

(C) 0

(D) t

(E) s

18. What is the equation of the line parallel to the x-axis and four units above the x-axis?

(A) $x = -4$

(B) $x = 4$

(C) $y = -4$

(D) $y = 0$

(E) $y = 4$

19. A car averages 27 miles per gallon. If gas costs $4.04 per gallon, which of the following is closest to how much the gas would cost for this car to travel 2,727 miles?

(A) $44.44

(B) $109.08

(C) $118.80

(D) $408.04

(E) $444.40

20. $x = 3$ and $y = 5$

By how much does the value of $3x^2 - 2y$ exceed the value of $2x^2 - 3y$

(A) 4

(B) 14

(C) 16

(D) 20

(E) 50

21. What is the value of x when $2x + 3 = 3x - 4$?

(A) -7

(B) $-\frac{1}{5}$

(C) 1

(D) $\frac{1}{5}$

(E) 7

22. What is the greatest common factor of 42, 126, and 210?

(A) 2
(B) 6
(C) 14
(D) 21
(E) 42

23. Sales for a business were 3 million dollars more the second year than the first, and sales for the third year were double the sales for the second year. If sales for the third year were 38 million dollars, what were sales, in millions of dollars, for the first year?

(A) 16
(B) 17.5
(C) 20.5
(D) 22
(E) 35

24. What is the largest integer n such that 3^n is a factor of 15^4?

(A) 1

(B) 2

(C) 3

(D) 4

(E) 5

25. Abandoned mines frequently fill with water. Before an abandoned mine can be reopened, the water must be pumped out. The size of pump required, depends on the depth of the mine. If pumping out a mine that is *d* feet deep requires a pump that pumps a minimum of $\frac{d^2}{25} + 4d - 250$ gallons per minute, pumping out a mine that is 150 feet deep would require a pump that pumps a minimum of how many gallons per minute?

(A) 362

(B) 500

(C) 800

(D) 1,250

(E) 1,750

26. The length, in inches, of a box is 3 inches less than twice its width, in inches. Which of the following gives the length, l inches, in terms of the width, w inches, of the box?

(A) $l = w + 3$

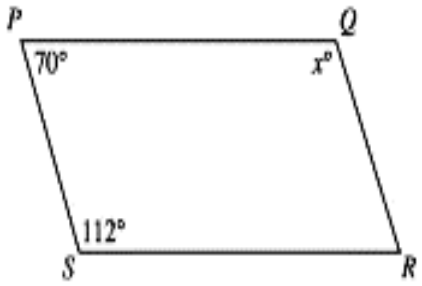
(B) $l = w + 3$

(C) $l = w - 3$

(D) $l = 2w + 3$

(E) l = 2w – 3

27. In quadrilateral *PQRS* below, sides *PS* and *QR* are parallel for what value of *x*?



(A) 158

(B) 132

(C) 120

(D) 110

(E) 70

28. How many irrational numbers are there between 1 and 6?

(A) 1

(B) 3

(C) 4

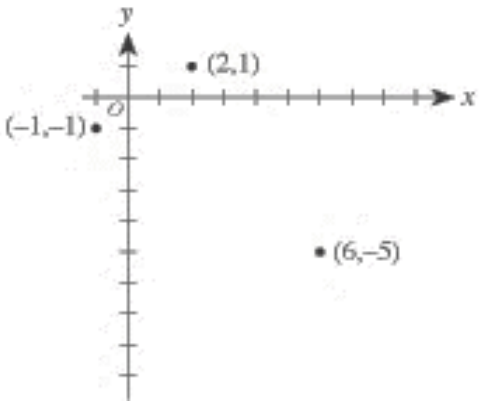
(D) 10

(E) Infinitely many

29. A typical high school student consumes 67.5 pounds of sugar per year. As part of a new nutrition plan, each member of a track team plans to lower the sugar he or she consumes by at least 20% for the coming year. Assuming each track member had consumed sugar at the level of a typical high school student and will adhere to this plan for the coming year, what is the maximum number of pounds of sugar to be consumed by each track team member in the coming year?

(A) 14
(B) 44
(C) 48
(D) 54
(E) 66

30. In the standard (x, y) coordinate plane below, 3 of the vertices of a rectangle are shown. Which of the following is the 4^{th} vertex of the rectangle?



(A) (3,–7)

(B) (4,–8)

(C) (5,–1)

(D) (8,–3)

(E) (9,–3)

ANSWER SHEET (Part 1)

1. D

Substitute $\sin\emptyset = \frac{5}{6.4}$

Solve for $\emptyset$ using the inverse of function.

$\emptyset = \arcsin\left(\frac{5}{6.4}\right)$

$\emptyset \approx 51.4°$

2. E

The value of arcsin (inverse of the sin function) for $\left(\frac{\sqrt{3}}{2}\right)$ would be $\frac{\pi}{3}$

3. A

$P(\text{dime}) = \frac{6}{12}$

$P(\text{quarter after dime}) = \frac{4}{11}$

$P(\text{dime and quarter}) = \frac{6}{12} * \frac{4}{11} = \frac{2}{11}$

4. B

Line a passes through the points (0,0) and (2,5), therefore the slope of line a is equal to $\frac{5}{2}$. Lines a and b are perpendicular, therefore, the slope of line b is equal to the negative reciprocal of the slope of line a. The slope is $-\frac{\frac{1}{5}}{2} = -\frac{2}{5}$

5. C

The side length of the square is 4r, so the area of the square is $16r^2$. The area of *one* circle is πr^2, so we subtract $4\pi r^2$ from the area of the square.

6. B

You do not know the value of the 2nd term or the 4th term of the sequence, but you do know the values of the 1st, 3rd, and 5thterms. The correct formula must give 8 as the value of the 1st term, 14 as the value of the 3rd term, and 20 as the value of the 5th term. Choice B, 3n + 5 gives the correct values for the 1st, 3rd, and 5th terms of the sequence.

7. D

The side of length 10 is the hypotenuse of a right triangle. The smaller side of that triangle is the hypotenuse of a 3-4-5 triangle.

$5^2 + w^2 = 10^2$

$w^2 = 100 - 25 = 75$

$w = \sqrt{75}$

8. B

If b = 0 and a = 5, then |a| - |b| = |5| - |0| = 5. If |a| - |b| = 5, it could be true that b = 0. None of the other 4 statements must be true.

9. E

The perimeter is 8x and the area is $3x^2$. When perimeter is divided by area the answer is $2.67x^{-1}$

10. D

A vertical line from point (4,4) to the x-axis will form a right triangle.

The area of the entire rectangle minus the right triangle would be 32 – 8 = 24.

11. A

The translated equation is:

$x + x + 58 = 100$

$2x = 42$

$x = 21$

12. C

I is even because adding two odd numbers is two more than an even number.

III is even because (y+1) is even, therefore has two as a factor.

13. A

Given 2 points on a line, the slope of the line can be found by dividing the change in y-coordinates between the pits by the change in x-coordinates. Since line m passes through the points (a, 0) and (0, 2a), its slope is $\frac{2a-0}{0-a} = \frac{2a}{-a} = -2$.

14. A

If the geometric mean is $(abc)^{1/3}$, then the three numbers with the largest product will have the largest geometric mean.

15. E

The intersection of sets S and T is the set of integers that are in S and also in T. Set S consists of all positive integers that are multiples of 7, and set T consists of all positive integers that are multiples of 13, so the intersection of S and T is the set of positive integers that are multiples of both 7 and 13. This is the set of all positive integers that are multiples of 91. There are an infinite number of positive integers that are multiples of 91, so there are more than thirteen integers in the intersection of S and T.

16. C

$\frac{2x^2+14x+24}{x+4}$ can be factored: $\frac{2(x^2+7x+12)}{x+4} = \frac{2(x+3)(x+4)}{x+4} = 2(x + 3)$

17. A

There will be an infinite number of solutions for s and t when the two equations give the same information. If x = -2, then the top equation is 2 times the bottom equation. This means that there is only one equation, and two unknowns: s and t. In this situation, an infinite number of pairs of values for s and t will satisfy the equation.

18. E

A line that is parallel to the x-axis and four units above the x-axis is the vertical translation of the x-axis four units upward. Since the x-axis is a horizontal line and has equation y = 0, then the line parallel to the x-axis and four units above the x-axis has equation y = 4.

19. D

If you divide 2,727 miles by 27 miles per gallon, you will get the number of gallons: 101. Then, multiply the number of gallons by the cost per gallon: 101(4.04) = 408.04. This gives the cost of gas for this car to travel 2,727 typical miles.

20. B

When you use $x = 3$ and $y = 5$ in the given expressions, $3x^2 - 2y = 3(3)^2 - 2(5) = 27 - 10 = 17$ and $2x^2 - 3y = 2(3)^2 - 3(5) = 18 - 15 = 3$. Then subtract 3 from 17 to get 14.

21. E

You can solve this problem by first subtracting $2x$ from each side of the equation to get $3 = x - 4$. Then add 4 to each side, so $x = 7$.

22. E

42 is the correct answer since it is the largest number that is a factor of all three numbers given. You can find the greatest common factor by writing out the prime factorization of all three numbers, and then taking each of the common prime factors to the lowest power that appears for that factor: $42 = 2 \times 3 \times 7$; $126 = 2 \times 3^2 \times 7$; and $210 = 2 \times 3 \times 5 \times 7$. So the greatest common factor is $2 \times 3 \times 7 = 42$.

23. A

If x = sales for the first year, then $x + 3$ = sales for the second year. Since sales for the third year were double the sales for the second year, sales for the third year = $2(x + 3)$. Sales for the third year were 38, so $2(x + 3) = 38$. To solve this equation, you could first divide each side by 2 to get $x + 3 = 19$. Then, by subtracting 3 from both sides, $x = 16$.

24. D

15^4 has four factors of 3. So the greatest number 3^n is n = 4.

25. D

If you substitute D with 150 in the expression:

$$\frac{150^2}{25} + 4(150) - 250 = \frac{22500}{25} + 600 - 250 = 1{,}250$$

26. E

Twice a number means to multiply the number by 2, and 3 less than a number means to subtract 3 from the number. Combining these, you get $l = 2w - 3$.

27. D

The question states that PS and QR are parallel. If you treat PQ as a transversal, then $\angle P$ and $\angle Q$ are interior angles on the same side of a transversal, so their measures add up to 180°. Since the measure of $\angle P$ is 70°, the measure of $\angle Q$ is 180° – 70° = 110°

28. E

1 and 6 are real numbers and there are an infinite number of irrational numbers between any two real numbers.

29. D

For each member of the track team to consume 20% less sugar, the track member will consume 100% – 20% = 80% of the level of a typical high school student.

80% of 67.5 = 0.80(67.5) = 54

30. A

When moving from (2,1) to (–1,–1), you can go 3 units left and 2 units down. Since you want to form a rectangle, you will need to move in the same pattern from (6,–5) to the 4th vertex. Subtract 3 from the x-value, and subtract 2 from the y-value, and you will find the point needed: (6 – 3, –5 – 2) = (3,–7).