

NAME _____

COMPASS Mathematics Practice Exam Pre-Test

1. $54 - 6 \div 2 + 6 = ?$

- A. 6
- B. 24
- C. 27
- D. 30
- E. 57

2. The lowest temperature on a winter morning was -8°F . Later that same day the temperature reached a high of 24°F . By how many degrees Fahrenheit did the temperature increase?

- A. 3°
- B. 8°
- C. 16°
- D. 24°
- E. 32°

3. If $\left(\frac{3}{4} - \frac{2}{3}\right) + \left(\frac{1}{2} + \frac{1}{3}\right)$ is calculated and the answer reduced to simplest terms, what is the denominator of the resulting fraction?

- A. 24
- B. 12
- C. 6
- D. 4
- E. 3

4. $\frac{1}{2} + \left(\frac{2}{3} \div \frac{3}{4}\right) - \left(\frac{4}{5} \times \frac{5}{6}\right) = ?$

- A. $\frac{1}{16}$
- B. $\frac{17}{27}$
- C. $\frac{13}{18}$
- D. $\frac{7}{9}$
- E. $\frac{5}{6}$

5. Mr. Brown went grocery shopping to buy meat for his annual office picnic. He bought $7\frac{3}{4}$ pounds of hamburger, 17.85 pounds of chicken, and $6\frac{1}{2}$ pounds of steak. How many pounds of meat did Mr. Brown buy?
- A. 32.10
 - B. 31.31
 - C. 26.25
 - D. 22.10
 - E. 21.10
6. Four students about to purchase concert tickets for \$18.50 for each ticket discover that they may purchase a block of 5 tickets for \$80.00. How much would each of the 4 save if they can get a fifth person to join them and the 5 people equally divide the price of the 5-ticket block?
- A. \$ 1.50
 - B. \$ 2.50
 - C. \$ 3.13
 - D. \$10.00
 - E. \$12.50
7. In scientific notation, $20,000 + 3,400,000 = ?$
- A. 3.42×10^6
 - B. 3.60×10^6
 - C. 3.42×10^7
 - D. 3.60×10^7
 - E. 3.60×10^{12}
8. Saying that $4 < \sqrt{x} < 9$ is equivalent to saying what about x ?
- A. $0 < x < 5$
 - B. $0 < x < 65$
 - C. $2 < x < 3$
 - D. $4 < x < 9$
 - E. $16 < x < 81$
 - F.
9. What value of x solves the following proportion? $\frac{9}{6} = \frac{x}{8}$
- A. $5\frac{1}{3}$
 - B. $6\frac{3}{4}$
 - C. $10\frac{1}{2}$
 - D. 11
 - E. 12

10. If the total cost of x apples is b cents, what is a general formula for the cost, in cents, of y apples?
- A. $\frac{b}{xy}$
 - B. $\frac{x}{by}$
 - C. $\frac{xy}{b}$
 - D. $\frac{by}{x}$
 - E. $\frac{bx}{y}$
11. On a math test, 12 students earned an A. This number is exactly 25% of the total number of students in the class. How many students are in the class?
- A. 3
 - B. 16
 - C. 21
 - D. 30
 - E. 48
12. This year, 75% of the graduating class of Harriet Tubman High School had taken at least 8 math courses. Of the remaining class members, 60% had taken 6 or 7 math courses. What percent of the graduating class had taken fewer than 6 math courses?
- A. 0%
 - B. 10%
 - C. 15%
 - D. 30%
 - E. 45%
13. Adam tried to compute the average of his 7 test scores. He mistakenly divided the correct sum of all of his test scores by 6, which yielded 84. What is Adam's correct average test score?
- A. 70
 - B. 72
 - C. 84
 - D. 96
 - E. 98
14. A total of 50 juniors and seniors were given a mathematics test. The 35 juniors attained an average score of 80 while the 15 seniors attained an average of 70. What was the average score for all 50 students who took the test?
- A. 73
 - B. 75
 - C. 76
 - D. 77
 - E. 78

15. If $x = -3$, what is the value of $\frac{x^2 - 1}{x + 1}$?

- A. -4
- B. -2
- C. 2
- D. $3\frac{2}{3}$
- E. 5

16. Doctors use the term *maximum heart rate (MHR)* when referring to the quantity found by starting with 220 beats per minute and subtracting 1 beat per minute for each year of a person's age. Doctors recommend exercising 3 or 4 times each week for at least 20 minutes with your heart rate increased from its *resting heart rate (RHR)* to its *training heart rate (THR)*, where

$$THR = RHR + .65(MHR - RHR)$$

Which of the following is closest to the *THR* of a 43-year-old person whose *RHR* is 54 beats per minute?

- A. 197
- B. 169
- C. 162
- D. 134
- E. 80

17. When getting into shape by exercising, the subject's maximum recommended number of heartbeats per minute (h) can be determined by subtracting the subject's age (a) from 220 and then taking 75% of that value. This relation is expressed by which of the following formulas?

- A. $h = .75(220 - a)$
- B. $h = .75(220) - a$
- C. $h = 220 - .75a$
- D. $.75h = 220 - a$
- E. $220 = .75(h - a)$

18. An airplane flew for 8 hours at an airspeed of x miles per hour (mph), and for 7 more hours at 325 mph. If the average airspeed for the entire flight was 350 mph, which of the following equations could be used to find x ?

- A. $x + 325 = 2(350)$
- B. $x + 7(325) = 15(350)$
- C. $8x - 7(325) = 350$
- D. $8x + 7(325) = 2(350)$
- E. $8x + 7(325) = 15(350)$

19. Which of the following is equivalent to $3a + 4b - (-6a - 3b)$?

- A. $16ab$
- B. $-3a + b$
- C. $-3a + 7b$
- D. $9a + b$
- E. $9a + 7b$

20. What is the sum of the polynomials $3a^2b + 2a^2b^2$ and $-ab^2 + a^2b^2$?

- A. $3a^2b - ab^2 + 3a^2b^2$
- B. $3a^2b - ab^2 + 2a^2b^2$
- C. $2a^2b + 3a^2b^2$
- D. $2a^2b^3 + 2a^4b^4$
- E. $-3a^3b^3 + 2a^4b$

21. Which of the following is a factor of the polynomial $x^2 - x - 20$?

- A. $x - 5$
- B. $x - 4$
- C. $x + 2$
- D. $x + 5$
- E. $x + 10$

22. Which of the following is a factor of $x^2 - 5x - 6$?

- A. $x + 2$
- B. $x - 6$
- C. $x - 3$
- D. $x - 2$
- E. $x - 1$

23. If $2(x - 5) = -11$, then $x =$?

- A. $-\frac{21}{2}$
- B. -8
- C. $-\frac{11}{2}$
- D. -3
- E. $-\frac{1}{2}$

24. If $\frac{4}{5} + \left(-\frac{3}{10}\right) = x + 1\frac{1}{2}$, then $x = ?$

- A. 2
- B. 1
- C. -1
- D. -2
- E. -10

25. For all nonzero r , t , and z values, $\frac{16r^3tz^5}{-4rt^3z^2} = ?$

- A. $-\frac{4z^3}{r^2t^2}$
- B. $-\frac{4r^2z^3}{t^2}$
- C. $-\frac{4rz}{t}$
- D. $-4r^4t^4z^7$
- E. $-4r^2t^2z^3$

26. For all $x > 0$ and $y > 0$, the radical expression $\frac{\sqrt{x}}{3\sqrt{x} - \sqrt{y}}$ is equivalent to:

- A. $\frac{3x - \sqrt{xy}}{9x + y}$
- B. $\frac{3x - \sqrt{xy}}{3x + y}$
- C. $\frac{3x + \sqrt{xy}}{9x - y}$
- D. $\frac{3x - \sqrt{xy}}{3x - y}$
- E. $\frac{x}{3x - y}$

27. For all $x \neq -4$, which of the following is equivalent to the expression below?

$$\frac{x^2 + 12x + 32}{x + 4}$$

- A. $x + 3$
- B. $x + 8$
- C. $x + 11$
- D. $x + 6$
- E. $x + 28$

28. Which of the following is a simplified expression equal to $\frac{9-x^2}{x-3}$ for all $x < -3$?
- A. $3x$
 - B. $x + 3$
 - C. $x - 3$
 - D. $-x + 3$
 - E. $-x - 3$
29. What is the slope of the line with the equation $2x + 3y + 6 = 0$?
- A. -6
 - B. -3
 - C. -2
 - D. $-\frac{2}{3}$
 - E. $\frac{2}{3}$
30. Point A $(-4, 1)$ is in the standard (x, y) coordinate plane. What must be the coordinates of point B so that the line $x = 2$ is the perpendicular bisector of \overline{AB} ?
- A. $(-6, 1)$
 - B. $(-4, -1)$
 - C. $(-4, 3)$
 - D. $(-2, 1)$
 - E. $(8, 1)$
31. What is the next term in the geometric sequence $16, -4, 1, \frac{-1}{4}, \dots$?
- A. $-\frac{1}{8}$
 - B. 0
 - C. $\frac{1}{16}$
 - D. $\frac{1}{8}$
 - E. $\frac{1}{2}$
32. A manufacturing company processes raw ore. The number of tons of refined material the company can produce during t days using Process A is $A(t) = t^2 + 2t$ and using Process B is $B(t) = 10t$. The company has only 7 days to process ore and must choose 1 of the processes. What is the maximum output of refined material, in tons, for this time period?
- A. 8
 - B. 10
 - C. 51
 - D. 63
 - E. 70

33. For the 2 functions, $f(x)$ and $g(x)$, tables of values are shown below. What is the value of $g(f(3))$?

x	$g(x)$
-5	7
-2	-5
1	3
3	2

x	$f(x)$
-2	3
1	-1
2	-3
3	-5

- A. -5
B. -3
C. -1
D. 2
E. 7

34. For positive real numbers x , y , and z , which of the following expressions is equivalent to $x^{\frac{1}{2}}y^{\frac{2}{3}}z^{\frac{5}{6}}$?

- A. $\sqrt[3]{xy^2z^3}$
B. $\sqrt[6]{xy^2z^5}$
C. $\sqrt[6]{x^3y^2z^5}$
D. $\sqrt[6]{x^3y^4z^5}$
E. $\sqrt[11]{xy^2z^5}$

35. If $A = \begin{bmatrix} 2 & -4 \\ 6 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & -4 \\ -6 & 0 \end{bmatrix}$, then $A - B = ?$

- A. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
C. $\begin{bmatrix} 0 & -8 \\ 0 & 0 \end{bmatrix}$
D. $\begin{bmatrix} 4 & 0 \\ 12 & 0 \end{bmatrix}$
E. $\begin{bmatrix} -4 & 0 \\ -12 & 0 \end{bmatrix}$

36. Listed below are 5 functions, each denoted $g(x)$ and each involving a real number constant $c > 1$. If $f(x) = 2^x$, which of these 5 functions yields the greatest value for $f(g(x))$, for all $x > 1$?

- A. $g(x) = cx$
- B. $g(x) = \frac{c}{x}$
- C. $g(x) = \frac{x}{c}$
- D. $g(x) = x - c$
- E. $g(x) = \log_c x$

37. If the function f satisfies the equation $f(x+y) = f(x) + f(y)$ for every pair of real numbers x and y , what are the possible values of $f(0)$?

- A. Any real number
- B. Any positive real number
- C. 0 and 1 only
- D. 1 only
- E. 0 only

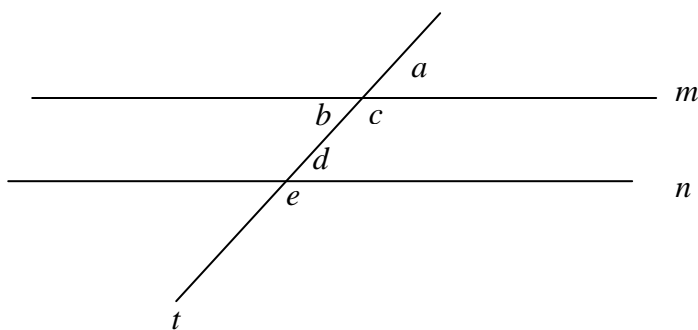
38. The imaginary number i is defined such that $i^2 = -1$. What does $i + i^2 + i^3 + \dots + i^{23}$ equal?

- A. i
- B. $-i$
- C. -1
- D. 0
- E. 1

39. In an arithmetic series, the terms of the series are equally spread out. For example, in 1, 5, 9, 13, 17, consecutive terms are 4 apart. If the first term in arithmetic series is 3, the last term is 136, and the sum is 1,390, what are the first 3 terms?

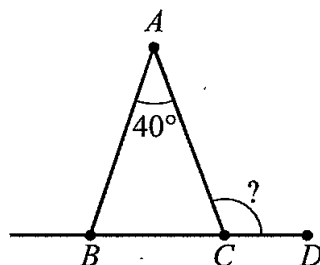
- A. 3, 10, 17
- B. 3, 23, 43
- C. 3, $36\frac{1}{3}$, 70
- D. 3, $69\frac{1}{2}$, 136
- E. 3, 139, 1,251

40. In the figure below, line m is parallel to line n , and line t is a transversal crossing both m and n . Which of the following lists has 3 angles that are all equal in measure?



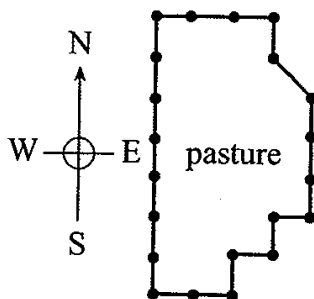
- A. $\angle a, \angle b, \angle d$
 B. $\angle a, \angle c, \angle d$
 C. $\angle a, \angle c, \angle e$
 D. $\angle b, \angle c, \angle d$
 E. $\angle b, \angle c, \angle e$
41. As shown in the figure below, $\triangle ABC$ is isosceles with the length of \overline{AB} equal to the length of \overline{AC} . The measure of $\angle A$ is 40° and points $B, C,$ and D are collinear. What is the measure of $\angle ACD$?

- A. 70°
 B. 80°
 C. 110°
 D. 140°
 E. 160°



42. The diagram below shows a pasture which is fenced in. All but 1 section of fence run straight north-south or east-west. Consecutive fence posts are 10 feet apart except for the 1 diagonal section. Which of the following statements best describes P , the perimeter of the pasture, in feet?

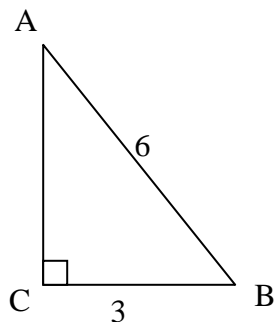
- A. $P > 210$
 B. $P = 210$
 C. $P < 210$
 D. $P > 230$
 E. $P = 240$



43. A person had a rectangular-shaped garden with sides of lengths 16 feet and 9 feet. The garden was changed into a square design with the same area as the original rectangular-shaped garden. How many feet in length are each of the sides of the new square-shaped garden?

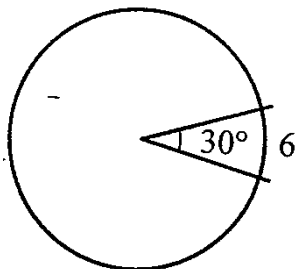
- A. 7
- B. 9
- C. 12
- D. $5\sqrt{7}$
- E. 16

44. In the figure below, $\triangle ABC$ is a right triangle. The length of \overline{AB} is 6 units and the length of \overline{CB} is 3 units. What is the length, in units, of \overline{AC} ?



- A. 5
- B. $3\sqrt{3}$
- C. $3 + \sqrt{5}$
- D. $3\sqrt{5}$
- E. $3\sqrt{6}$

45. If a central angle of measure 30° is subtended by a circular arc of length 6 meters, as is illustrated below, how many meters in length is the radius of the circle?



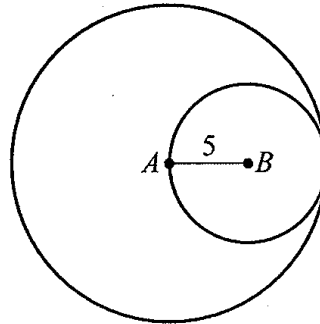
- A. $\frac{\pi}{36}$
- B. $\frac{1}{5}$
- C. π
- D. $\frac{36}{\pi}$
- E. 180

46. A rectangular box with a base 2 inches by 6 inches is 10 inches tall and holds 12 ounces of breakfast cereal. The manufacturer wants to use a new box with a base 3 inches by 5 inches. How many inches tall should the new box be in order to hold exactly the same volume as the original box? (Note: The volume of a rectangular box may be calculated by multiplying the area of the base by the height of the box.)

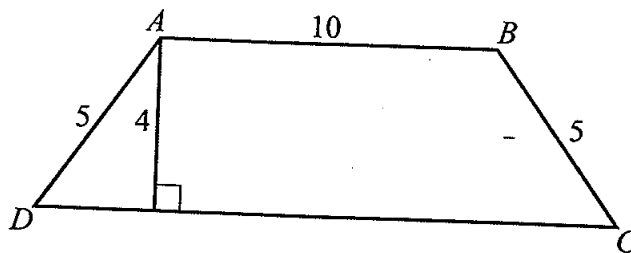
- A. 8
- B. 9
- C. 10
- D. 11
- E. 12

47. In the figure below, the circle centered at B is internally tangent to the circle centered at A. The smaller circle passes through the center of the larger circle and the length of \overline{AB} is 5 units. If the smaller circle is cut out of the larger circle, how much of the area, in square units, of the larger circle will remain?

- A. 10π
- B. 25π
- C. 75π
- D. 100π
- E. 300π



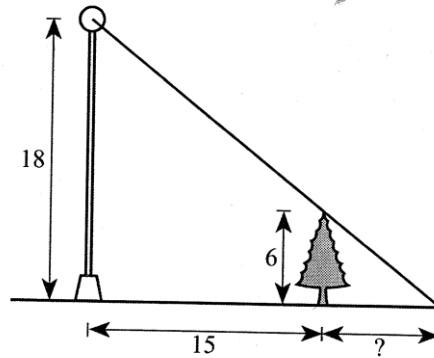
48. In the figure below, \overline{AB} and \overline{CD} are parallel and lengths are given in units. What is the area, in square units, of trapezoid $ABCD$?



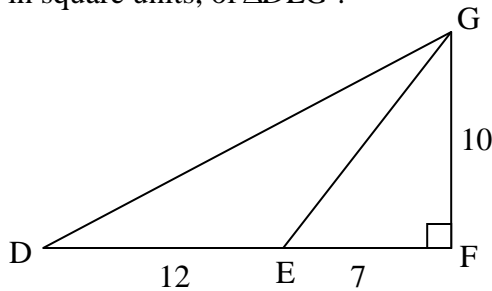
- A. 36
- B. 52
- C. 64
- D. 65
- E. 104

49. A 6-foot spruce tree is planted 15 feet from a lighted streetlight whose lamp is 18 feet above the ground. How many feet long is the shadow of that tree?

- A. 5.0
 B. 7.5
 C. 7.8
 D. 9.6
 E. 10.0



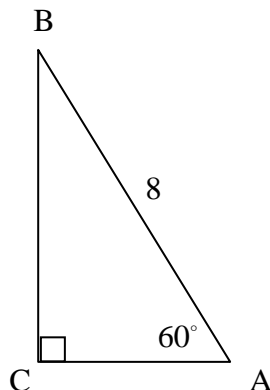
50. In the figure below, the lengths of \overline{DE} , \overline{EF} , and \overline{FG} are given, in units. What is the area, in square units, of $\triangle DEG$?



- A. 29
 B. 47.5
 C. 60
 D. $6\sqrt{149}$
 E. 120

51. In the right triangle shown below, the length of \overline{AB} is 8 units, $\angle A$ measures 60° , $\sin 60^\circ \approx 0.866$, $\cos 60^\circ \approx 0.5$, and $\tan 60^\circ \approx 1.73$. Approximately how many units long is \overline{BC} , to the nearest hundredth of a unit?

- A. 4.00
 B. 4.61
 C. 4.80
 D. 6.93
 E. 9.23



52. If $\sin \alpha = \frac{12}{13}$, and $\cos \alpha = \frac{5}{13}$, then $\tan \alpha = ?$

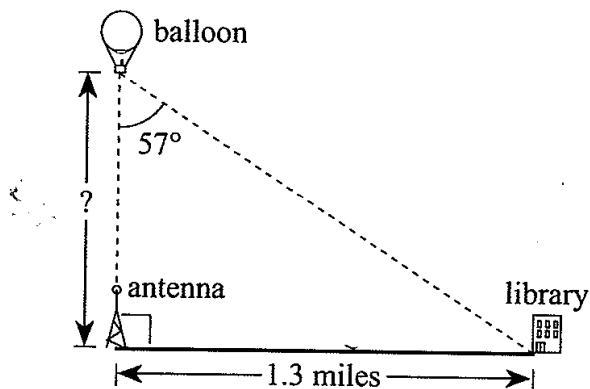
- A. $\frac{5}{12}$
- B. $\frac{7}{13}$
- C. $\frac{12}{5}$
- D. $\frac{17}{13}$
- E. $\frac{60}{13}$

53. If $0^\circ < x^\circ < 90^\circ$ and $\sin x = \frac{1}{2}$, then $\cos x = ?$

- A. $\frac{1}{2}$
- B. $\frac{\sqrt{3}}{2}$
- C. 2
- D. $\frac{\sqrt{3}}{3}$
- E. $\frac{2\sqrt{3}}{3}$

54. From a hot air balloon, the angle between a radio antenna straight below and the base of the library downtown is 57° , as shown below. If the distance between the radio antenna and the library is 1.3 miles, how many miles high is the balloon?

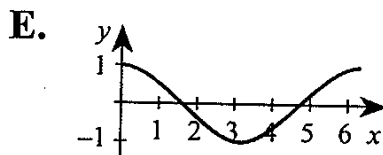
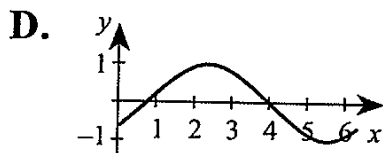
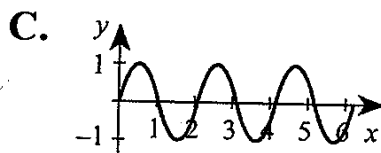
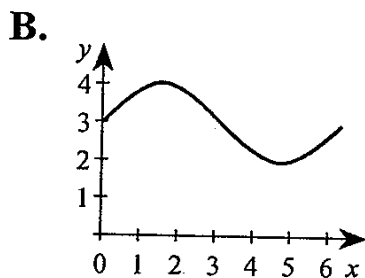
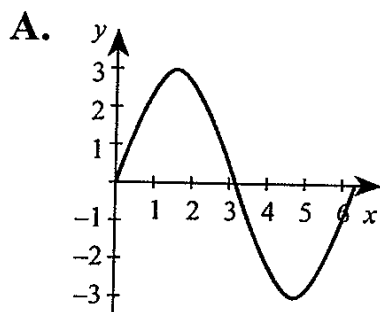
- A. $\frac{1.3}{\sin 57^\circ}$
- B. $\frac{1.3}{\cos 57^\circ}$
- C. $\frac{1.3}{\tan 57^\circ}$
- D. $1.3 \sin 57^\circ$
- E. $1.3 \tan 57^\circ$



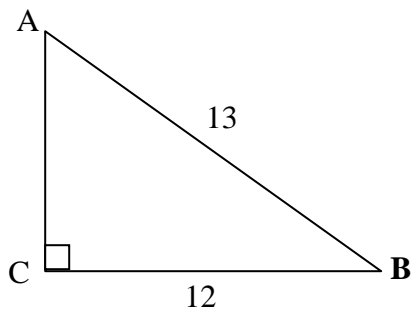
55. What is the smallest positive value for x where $y = \sin 2x$ reaches its maximum?

- A. $\frac{\pi}{4}$
- B. π
- C. $\frac{3\pi}{2}$
- D. 2π
- E. $\frac{5\pi}{2}$

56. One of the graphs below is that of $y = A\sin \theta$ for θ between 0 and 6.28 radians, Where A is a constant. Which one?



57. In the right triangle below, the length of \overline{AB} is 13 units and the length of \overline{CB} is 12 units. What is the tangent of $\angle A$?



- A. $\frac{12}{5}$
- B. $\frac{13}{12}$
- C. $\frac{12}{13}$
- D. $\frac{5}{12}$
- E. $\frac{5}{13}$