

Practice Test 2

Examinee Agreement and Signature: By testing today, I agree to the terms and conditions set forth in the ACT registration booklet or website for this exam, including the provisions about prohibited behaviors. I also certify that I am the person whose signature appears below.

Today's Date: _____

Your Signature: _____

Print Your Name Here: _____

Your Date of Birth:					
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Month			Day		Year

Form 2MC



Directions

This booklet contains tests in English, Mathematics, Reading, and Science. These tests measure skills and abilities highly related to high school course work and success in college. **CALCULATORS MAY BE USED ON THE MATHEMATICS TEST ONLY.**

The questions in each test are numbered, and the suggested answers for each question are lettered. On the answer document, the rows of ovals are numbered to match the questions, and the ovals in each row are lettered to correspond to the suggested answers.

For each question, first decide which answer is best. Next, locate on the answer document the row of ovals numbered the same as the question. Then, locate the oval in that row lettered the same as your answer. Finally, fill in the oval completely. Use a soft lead pencil and make your marks heavy and black. **DO NOT USE INK OR A MECHANICAL PENCIL.**

Mark only one answer to each question. If you change your mind about an answer, erase your first mark thoroughly before marking your new answer. For each question, make certain that you mark in the row of ovals with the same number as the question.

Only responses marked on your answer document will be scored. Your score on each test will be based only on the number of questions you answer correctly during the time allowed for that test. You will **NOT** be penalized for guessing. **IT IS TO YOUR ADVANTAGE TO ANSWER EVERY QUESTION EVEN IF YOU MUST GUESS.**

You may work on each test **ONLY** when your test supervisor tells you to do so. If you finish a test before time is called for that test, you should use the time remaining to reconsider questions you are uncertain about in that test. You may **NOT** look back to a test on which time has already been called, and you may **NOT** go ahead to another test. To do so will disqualify you from the examination.

Lay your pencil down immediately when time is called at the end of each test. You may **NOT** for any reason fill in or alter ovals for a test after time is called for that test. To do so will disqualify you from the examination.

Do not fold or tear the pages of your test booklet.

**DO NOT OPEN THIS BOOKLET
UNTIL TOLD TO DO SO.**

**MATHEMATICS TEST****60 Minutes—60 Questions**

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

-
1. A restaurant occupying the top floor of a skyscraper rotates as diners enjoy the view. Ling and Sarah notice that they began their meal at 7:00 P.M. looking due north. At 7:45 P.M. they had rotated 180° to a view that was due south. At this rate, how many degrees will the restaurant rotate in 1 hour?

- A. 90°
- B. 180°
- C. 240°
- D. 270°
- E. 400°

2. If 12 vases cost \$18.00, what is the cost of 1 vase?

- F. \$0.67
- G. \$1.05
- H. \$1.33
- J. \$1.50
- K. \$1.60

3. Your friend shows you a scale drawing of her apartment. The drawing of the apartment is a rectangle 4 inches by 6 inches. Your friend wants to know the length of the shorter side of the apartment. If she knows that the length of the longer side of the apartment is 30 feet, how many feet long is the shorter side of her apartment?

- A. 9
- B. 20
- C. 24
- D. 30
- E. 45

4. A company earned a profit of \$8.0 million each year for 3 consecutive years. For each of the next 2 years the company earned a profit of \$9.0 million. For this 5-year period, what was the company's average yearly profit, in millions of dollars?

- F. 8.2
- G. 8.25
- H. 8.4
- J. 8.5
- K. 8.6

DO YOUR FIGURING HERE.**GO ON TO THE NEXT PAGE.**

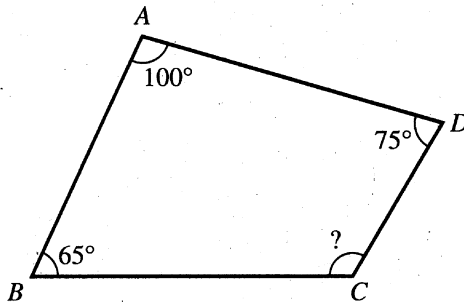


5. A company rents moving vans for a rental fee of \$25.00 per day with an additional charge of \$0.30 per mile that the van is driven. Which of the following expressions represents the cost, in dollars, of renting a van for 1 day and driving it m miles?

A. $0.30m + 25$
 B. $25m + 30$
 C. $30m + 25$
 D. $25.30m$
 E. $55m$

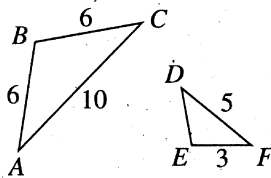
DO YOUR FIGURING HERE.

6. The figure below shows quadrilateral $ABCD$. What is the measure of $\angle C$?



F. 120°
 G. 115°
 H. 105°
 J. 100°
 K. 80°

7. In the figure below, $\triangle ABC$ and $\triangle DEF$ are similar triangles with the given side lengths in meters. What is the perimeter, in meters, of $\triangle DEF$?



A. 3
 B. 8
 C. 11
 D. 12
 E. 13

8. The relationship between temperature in degrees Fahrenheit, F , and temperature in degrees Celsius, C , is expressed by the formula $F = \frac{9}{5}C + 32$. Calvin reads a temperature of 38° on a Celsius thermometer. To the nearest degree, what is the equivalent temperature on a Fahrenheit thermometer?

F. 36°
 G. 53°
 H. 68°
 J. 70°
 K. 100°

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DO YOUR FIGURING HERE.

9. Nick needs to order 500 pens from his supplier. The catalog shows that these pens come in cases of 24 boxes with 10 pens in each box. Nick knows that he may NOT order partial cases. What is the fewest number of cases he should order?

A. 2
 B. 3
 C. 18
 D. 21
 E. 50

10. When $a + b = 6$, what is the value of

$$2(a + b) + \frac{a + b}{6} + (a + b)^2 - 2?$$

F. 23
 G. 37
 H. 38
 J. 43
 K. 47

11. The cost of a hamburger and a soft drink together is \$2.10. The cost of 2 hamburgers and a soft drink together is \$3.50. What is the cost of a soft drink?

A. \$0.50
 B. \$0.55
 C. \$0.70
 D. \$1.05
 E. \$1.40

12. If $12x = -8(10 - x)$, then $x = ?$

F. 20
 G. 8
 H. $7\frac{3}{11}$
 J. $6\frac{2}{13}$
 K. -20

13. Shannon is planning to tile a rectangular kitchen countertop that is 24 inches wide and 64 inches long. She determined that 1 tile will be needed for each 4-inch-by-4-inch region. What is the minimum number of tiles that will be needed to completely cover the countertop to its edges?

A. 44
 B. 88
 C. 96
 D. 176
 E. 384

14. Which of the following lists gives 2 of the 3 interior angle measurements of a triangle for which the 3rd angle measurement would be equal to 1 of the 2 given measurements?

F. 20° , 40°
 G. 30° , 60°
 H. 40° , 100°
 J. 45° , 120°
 K. 50° , 60°

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15. A triangle with a perimeter of 66 inches has one side that is 16 inches long. The lengths of the other two sides have a ratio of 2:3. What is the length, in inches, of the *longest* side of the triangle?

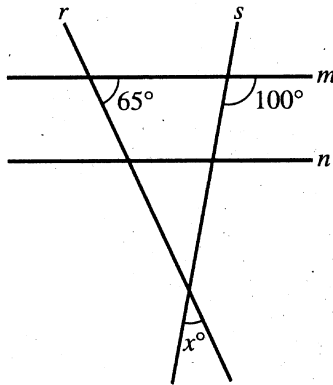
A. 16
 B. 20
 C. 30
 D. 40
 E. 50

DO YOUR FIGURING HERE.

16. What is the y -intercept of the line in the standard (x,y) coordinate plane that goes through the points $(-3,6)$ and $(3,2)$?

F. 0
 G. 2
 H. 4
 J. 6
 K. 8

17. In the figure below, lines m and n are parallel, transversals r and s intersect to form an angle of measure x° , and 2 other angle measures are as marked. What is the value of x ?



A. 15
 B. 25
 C. 35
 D. 65
 E. 80

18. The depth of a pond is 180 cm and is being reduced by 1 cm per week. The depth of a second pond is 160 cm and is being reduced by $\frac{1}{2}$ cm per week. If the depths of both ponds continue to be reduced at these constant rates, in about how many weeks will the ponds have the same depth?

F. 10
 G. 20
 H. 40
 J. 80
 K. 140

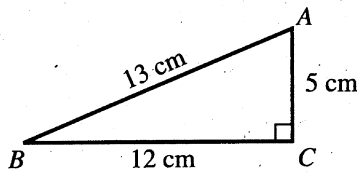
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DO YOUR FIGURING HERE.

19. When graphed in the standard (x,y) coordinate plane, which of the following equations does NOT represent a line?

- A. $x = 4$
- B. $3y = 6$
- C. $x - y = 1$
- D. $y = \frac{3}{4}x - 2$
- E. $x^2 + y = 5$

20. In the right triangle shown below, which of the following statements is true about $\angle A$?



- F. $\cos A = \frac{12}{13}$
- G. $\sin A = \frac{12}{13}$
- H. $\tan A = \frac{12}{13}$
- J. $\cos A = \frac{13}{12}$
- K. $\sin A = \frac{13}{12}$

21. What is the slope of any line parallel to the line $7x + 9y = 6$?

- A. -7
- B. $-\frac{7}{9}$
- C. $\frac{7}{6}$
- D. 6
- E. 7

22. The braking distance, y feet, for Damon's car to come to a complete stop is modeled by $y = \frac{3(x^2 + 10x)}{40}$, where x is the speed of the car in miles per hour. According to this model, which of the following is the maximum speed, in miles per hour, Damon can be driving so that the braking distance is less than or equal to 150 feet?

- F. 10
- G. 30
- H. 40
- J. 50
- K. 60

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23. If $f(x) = x^2 + x + 5$ and $g(x) = \sqrt{x}$, then what is the value of $\frac{g(4)}{f(1)}$?

A. $\frac{2}{7}$
B. $\frac{25}{7}$
C. $\frac{2}{25}$
D. 2
E. 4

24. At a school picnic, 1 junior and 1 senior will be selected to lead the activities. If there are 125 juniors and 100 seniors at the picnic, how many different 2-person combinations of 1 junior and 1 senior are possible?

F. 25
G. 100
H. 125
J. 225
K. 12,500

25. A ramp for wheelchair access to the gym has a slope of 5% (that is, the ramp rises 5 feet vertically for every 100 feet of horizontal distance). The entire ramp is built on level ground, and the entrance to the gym is 2 feet above the ground. What is the *horizontal* distance, in feet, between the ends of the ramp?

A. 4
B. 10
C. 40
D. 100
E. 400

26. The temperature, t , in degrees Fahrenheit, in a certain town on a certain spring day satisfies the inequality $|t - 24| \leq 30$. Which of the following temperatures, in degrees Fahrenheit, is NOT in this range?

F. -10
G. -6
H. -5
J. 0
K. 54

27. If 5 times a number n is subtracted from 15, the result is negative. Which of the following gives the possible value(s) for n ?

A. 0 only
B. 3 only
C. 10 only
D. All $n > 3$
E. All $n < 3$

DO YOUR FIGURING HERE.

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28. $(x^2 - 4x + 3) - (3x^2 - 4x - 3)$ is equivalent to:

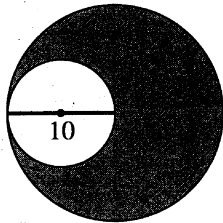
- F. $2x^2 - 6$
- G. $2x^2 - 8x$
- H. $2x^2 - 8x - 6$
- J. $-2x^2 + 6$
- K. $-2x^2 - 8x$

DO YOUR FIGURING HERE.

29. The median of a set of data containing 9 items was found. Four data items were added to the set. Two of these items were greater than the original median, and the other 2 items were less than the original median. Which of the following statements *must* be true about the median of the new data set?

- A. It is the average of the 2 new lower values.
- B. It is the same as the original median.
- C. It is the average of the 2 new higher values.
- D. It is greater than the original median.
- E. It is less than the original median.

30. The figure below shows 2 tangent circles such that the 10-centimeter diameter of the smaller circle is equal to the radius of the larger circle. What is the area, in square centimeters, of the shaded region?



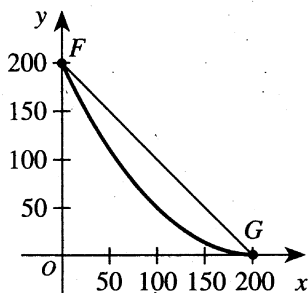
- F. 10
- G. 75
- H. 5π
- J. 10π
- K. 75π

31. Which of the following sets of 3 numbers could be the side lengths, in meters, of a 30° - 60° - 90° triangle?

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

Use the following information to answer questions 32–34.

The curve $y = 0.005x^2 - 2x + 200$ for $0 \leq x \leq 200$ and the line segment from $F(0,200)$ to $G(200,0)$ are shown in the standard (x,y) coordinate plane below.



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32. What is the y -coordinate for the point on the curve with x -coordinate 20?

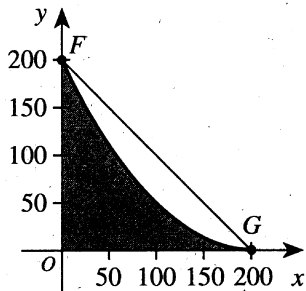
- F. 160
- G. 162
- H. 164
- J. 166
- K. 168

DO YOUR FIGURING HERE.

33. The length of this curve is longer than \overline{FG} . About how many coordinate units long is \overline{FG} ?

- A. 20
- B. 141
- C. 200
- D. 283
- E. 400

34. Tran wants to approximate the area underneath the curve $y = 0.005x^2 - 2x + 200$ for $0 \leq x \leq 200$, shown shaded in the graph below.



He finds an initial estimate, A , for the shaded area by using \overline{FG} and computing

$$A = \frac{1}{2}(200 \text{ units})(200 \text{ units}) = 20,000 \text{ square units.}$$

The area of the shaded region is:

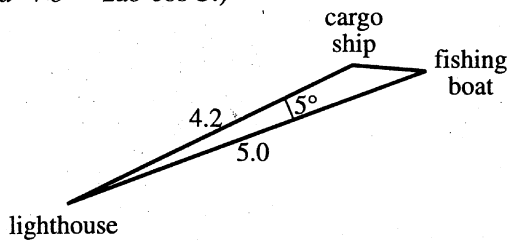
- F. less than 20,000 square units, because the curve lies under \overline{FG} .
- G. less than 20,000 square units, because the curve lies over \overline{FG} .
- H. equal to 20,000 square units.
- J. greater than 20,000 square units, because the curve lies under \overline{FG} .
- K. greater than 20,000 square units, because the curve lies over \overline{FG} .

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35. A cargo ship is 4.2 miles from a lighthouse, and a fishing boat is 5.0 miles from the lighthouse, as shown below. The angle between the straight lines from the lighthouse to the 2 vessels is 5° . The approximate distance, in miles, from the cargo ship to the fishing boat is given by which of the following expressions?

(Note: The law of cosines states that for any triangle with vertices A , B , and C and the sides opposite those vertices with lengths a , b , and c , respectively, $c^2 = a^2 + b^2 - 2ab \cos C$.)



- A. $\sqrt{(5.0)^2 - (4.2)^2}$
 B. $\sqrt{(4.2)^2 + (5.0)^2 - 2 \cdot 4.2 \cdot 5.0 \cos 5^\circ}$
 C. $\sqrt{(4.2)^2 + (5.0)^2 + 2 \cdot 4.2 \cdot 5.0 \cos 5^\circ}$
 D. $\sqrt{(4.2)^2 + (5.0)^2 - 2 \cdot 4.2 \cdot 5.0 \cos 85^\circ}$
 E. $\sqrt{(4.2)^2 + (5.0)^2 + 2 \cdot 4.2 \cdot 5.0 \cos 85^\circ}$
36. Which of the following equations expresses c in terms of a for all real numbers a , b , and c such that $a^3 = b$ and $b^2 = c$?
- F. $c = a^6$
 G. $c = a^5$
 H. $c = 2a^3$
 J. $c = \frac{1}{2}a$
 K. $c = a$
37. Which of the following statements is NOT true about the arithmetic sequence 17, 12, 7, 2, ...?
- A. The fifth term is -3 .
 B. The sum of the first 5 terms is 35.
 C. The eighth term is -18 .
 D. The common difference of consecutive terms is -5 .
 E. The common ratio of consecutive terms is -5 .

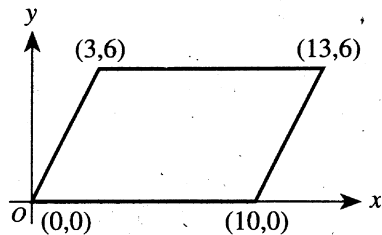
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38. In the standard (x,y) coordinate plane below, the points $(0,0)$, $(10,0)$, $(13,6)$, and $(3,6)$ are the vertices of a parallelogram. What is the area, in square coordinate units, of the parallelogram?

- F. 30
G. 60
H. $30\sqrt{3}$
J. $30\sqrt{5}$
K. $60\sqrt{5}$



DO YOUR FIGURING HERE.

39. The normal amount of lead in a certain water supply is 1.5×10^{-5} milligrams per liter. Today, when the water was tested, the lead level found was exactly 100 times as great as the normal level, still well below the Environmental Protection Agency's action level. What concentration of lead, in milligrams per liter, was in the water tested today?

- A. 1.5×10^{-105}
B. 1.5×10^{-10}
C. 1.5×10^{-7}
D. 1.5×10^{-3}
E. $1.5 \times 10^{-\frac{5}{2}}$

40. A certain perfect square has exactly 4 digits (that is, it is an integer between 1,000 and 9,999). The positive square root of the perfect square must have how many digits?

- F. 1
G. 2
H. 3
J. 4
K. Cannot be determined from the given information

41. $\left(\frac{1}{2}x - y\right)^2 = ?$

- A. $\frac{1}{4}x^2 + y^2$
B. $\frac{1}{4}x^2 - xy + y^2$
C. $\frac{1}{2}x^2 - xy + y^2$
D. $x^2 + y^2$
E. $x^2 - xy + y^2$

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DO YOUR FIGURING HERE.

42. What is the matrix product $\begin{bmatrix} a \\ 2a \\ 3a \end{bmatrix} [1 \ 0 \ -1]$?

F. $\begin{bmatrix} a & 0 & -a \\ 2a & 0 & -2a \\ 3a & 0 & -3a \end{bmatrix}$

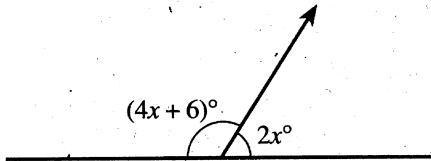
G. $\begin{bmatrix} a & 2a & 3a \\ 0 & 0 & 0 \\ -a & -2a & -3a \end{bmatrix}$

H. $[2a \ 0 \ -2a]$

J. $[6a \ 0 \ -6a]$

K. $[0]$

43. What is the degree measure of the smaller of the 2 angles formed by the line and the ray shown in the figure below?



- A. 14°
 B. 28°
 C. 29°
 D. 58°
 E. Cannot be determined from the given information

44. How many prime numbers are there between 30 and 50?

- F. 4
 G. 5
 H. 6
 J. 7
 K. 8

45. The lengths, in feet, of the sides of right triangle $\triangle ABC$ are as shown in the diagram below, with $x > 0$. What is the cotangent of $\angle A$, in terms of x ?

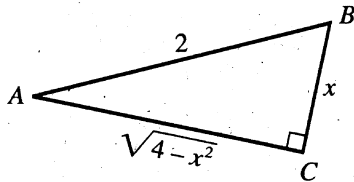
A. $\sqrt{4-x^2}$

B. $\frac{2}{x}$

C. $\frac{x}{2}$

D. $\frac{x}{\sqrt{4-x^2}}$

E. $\frac{\sqrt{4-x^2}}{x}$



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