

Practice Test 4

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 4MC



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.

DO YOUR FIGURING HERE.

1. On level ground, a vertical rod 12 feet tall casts a shadow 4 feet long, and at the same time a nearby vertical flagpole casts a shadow 12 feet long. How many feet tall is the flagpole?

- A. 4
- B. 8
- C. 12
- D. 20
- E. 36

2. The cost of a gym membership is a onetime fee of \$140, plus a monthly fee of \$40. Brendan wrote a \$500 check to pay his gym membership for a certain number of months, including the onetime fee. How many months of membership did he pay for?

- F. 3
- G. 4
- H. 9
- J. 12
- K. 13

3. If $x = -5$, what is the value of $\frac{x^2 - 1}{x + 1}$?

- A. -6
- B. -4
- C. 4
- D. $5\frac{4}{5}$
- E. 19

4. A museum offers a 2-hour guided group tour. For groups with fewer than 25 people the cost is \$9.25 per person; for groups with 25 people or more the cost is \$8.50 per person. The 27 people in the 9:00 a.m. tour group each paid \$9.25 in advance. What is the total refund that the museum owes the 9:00 a.m. group?

- F. \$12.50
- G. \$13.00
- H. \$18.75
- J. \$20.25
- K. \$25.00

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5. The 13-member math club needs to choose a student government representative. They decide that the representative, who will be chosen at random, CANNOT be any of the 3 officers of the club. What is the probability that Samara, who is a member of the club but NOT an officer, will be chosen?

DO YOUR FIGURING HERE.

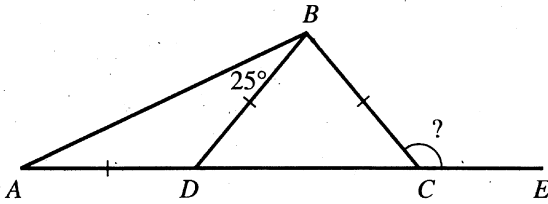
- A. 0
- B. $\frac{1}{13}$
- C. $\frac{1}{10}$
- D. $\frac{3}{13}$
- E. $\frac{1}{3}$
6. What is the perimeter, in centimeters, of a rectangle with length 15 cm and width 6 cm?
- F. 21
- G. 30
- H. 42
- J. 90
- K. 180
7. Tickets for a community theater production cost \$6 each when bought in advance and \$8 each when bought at the door. The theater group's goal is at least \$2,000 in ticket sales for opening night. The theater group sold 142 opening-night tickets in advance. What is the minimum number of tickets they need to sell at the door on opening night to make their goal?
- A. 143
- B. 144
- C. 192
- D. 250
- E. 357
8. For what value of r is the equation $\frac{8}{12} = \frac{10}{r}$ true?
- F. 3
- G. 6
- H. 14
- J. 15
- K. 18
9. If $12(x - 11) = -15$, then $x = ?$
- A. $-\frac{49}{4}$
- B. $-\frac{13}{6}$
- C. $-\frac{5}{4}$
- D. $-\frac{1}{3}$
- E. $\frac{39}{4}$

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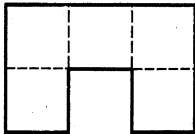


DO YOUR FIGURING HERE.

10. In the figure below, A , D , C , and E are collinear. \overline{AD} , \overline{BD} , and \overline{BC} are all the same length, and the angle measure of $\angle ABD$ is as marked. What is the degree measure of $\angle BCE$?



- F. 50°
 G. 100°
 H. 105°
 J. 130°
 K. 160°
11. If $f(x) = 9x^2 + 5x - 8$, then $f(-2) = ?$
- A. -54
 B. -18
 C. 18
 D. 36
 E. 38
12. What is the least common multiple of 30, 20, and 70?
- F. 40
 G. 42
 H. 120
 J. 420
 K. 42,000
13. While doing a problem on his calculator, Tom meant to divide a number by 2, but instead he accidentally multiplied the number by 2. Which of the following calculations could Tom then do to the result on the calculator screen to obtain the result he originally wanted?
- A. Subtract the original number
 B. Multiply by 2
 C. Multiply by 4
 D. Divide by 2
 E. Divide by 4
14. The 8-sided figure below is divided into 5 congruent squares. The total area of the 5 squares is 125 square inches. What is the perimeter, in inches, of the figure?



- F. 25
 G. 60
 H. 80
 J. 100
 K. 125

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15. In $\triangle ABC$, $\angle A$ measures greater than 43° and $\angle B$ measures exactly 90° . Which of the following phrases best describes the measure of $\angle C$?

- A. Greater than 47°
- B. Equal to 47°
- C. Equal to 60°
- D. Equal to 133°
- E. Less than 47°

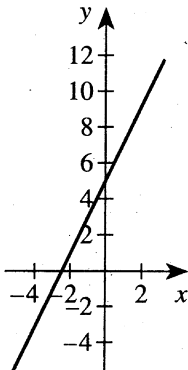
DO YOUR FIGURING HERE.

16. Among the following arithmetic operations, which could the symbol \diamond represent given that the equation $(2 \diamond 1)^4 + (6 \diamond 3)^2 = 10$ is true?

- I. Addition
- II. Subtraction
- III. Division

- F. I only
- G. II only
- H. III only
- J. I and II only
- K. I, II, and III

17. One of the following is an equation of the linear relation shown in the standard (x,y) coordinate plane below. Which equation is it?



- A. $y = 5x$
- B. $y = 2x$
- C. $y = 5x + 2$
- D. $y = 2x - 5$
- E. $y = 2x + 5$

18. An integer, n , is added to 4. That sum is then multiplied by 8. This result is 10 less than twice the original integer. Which of the following equations represents this relationship?

- F. $8(n + 4) = 2n - 10$
- G. $8(n + 4) - 10 = 2n$
- H. $8(n + 4) = 10 - 2n$
- J. $n + 4 \times 8 = 2n - 10$
- K. $4 + 8 = 2n - 10$

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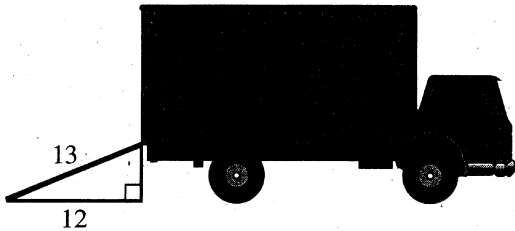


DO YOUR FIGURING HERE.

19. Two workers were hired to begin work at the same time. Worker A's contract called for a starting salary of \$20,000 with an increase of \$800 after each year of employment. Worker B's contract called for a starting salary of \$15,200 with an increase of \$2,000 after each year of employment. If x represents the number of full years' employment (that is, the number of yearly increases each worker has received), which of the following equations could be solved to determine the number of years until B's yearly salary equals A's yearly salary?

- A. $20,000 + 800x = 15,200 + 2,000x$
 B. $20,000 + 2,000x = 15,200 + 800x$
 C. $(20,000 + 800)x = (15,200 + 2,000)x$
 D. $(2,000 + 800)x = 20,000 - 15,200$
 E. $(2,000 - 800)x = 20,000 + 15,200$

20. A ramp for loading trucks is 13 feet long and covers 12 feet along the level ground, as shown below. How many feet high is the highest point on the ramp?



- F. 1
 G. 2
 H. 4
 J. 5
 K. $6\frac{1}{4}$
21. The expression $7(x + 3) - 3(2x - 2)$ is equivalent to:
- A. $x + 1$
 B. $x + 15$
 C. $x + 19$
 D. $x + 23$
 E. $x + 27$

22. If $x + y = 32$, and $x - y = 12$, then $y = ?$

- F. 6
 G. 10
 H. 20
 J. 22
 K. 44

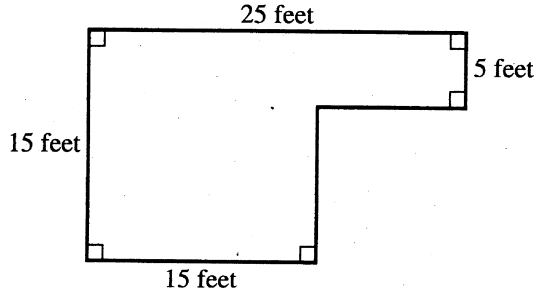
23. When $(2x - 3)^2$ is written in the form $ax^2 + bx + c$, where a , b , and c are integers, $a + b + c = ?$

- A. -17
 B. -5
 C. 1
 D. 13
 E. 25

GO ON TO THE NEXT PAGE.



24. What is the area, in square feet, of the figure below?



DO YOUR FIGURING HERE.

- F. 60
 G. 80
 H. 275
 J. 375
 K. 450
25. The table below gives the values of 2 functions, f and g , for various values of x . One of the functions expresses a linear relationship. What is the value of that function at $x = 4$?

x	$f(x)$	$g(x)$
-2	1.4	0.6
-1	1.2	0.9
0		
1	0.8	1.3
2	0.6	1.6
3		
4		

- A. 0.2
 B. 0.4
 C. 1.9
 D. 2.0
 E. 2.2
26. What is the slope of the line represented by the equation $6y - 14x = 5$?
- F. -14
 G. $\frac{5}{6}$
 H. $\frac{7}{3}$
 J. 6
 K. 14
27. What is the sum of the 2 solutions of the equation $x^2 + x - 12 = 0$?
- A. -12
 B. -4
 C. -1
 D. 0
 E. 3

GO ON TO THE NEXT PAGE.



DO YOUR FIGURING HERE.

28. Two similar triangles have perimeters in the ratio 3:5. The sides of the smaller triangle measure 3 cm, 5 cm, and 7 cm, respectively. What is the perimeter, in centimeters, of the larger triangle?

F. 15
G. 18
H. 20
J. 25
K. 36

29. At a certain location, the low temperatures, in degrees Fahrenheit, for each of 7 consecutive days in January were -2°F , 4°F , -3°F , 1°F , 2°F , -5°F , and -6°F . What was the median of these low temperatures?

A. -2°F
B. -1°F
C. 1°F
D. 3°F
E. 4°F

30. When asked his age, the algebra teacher said, "If you square my age, then subtract 23 times my age, the result is 50." How old is he?

F. 23
G. 25
H. 27
J. 46
K. 50

31. The distance, d , an accelerating object travels in t seconds can be modeled by the equation $d = \frac{1}{2}at^2$, where a is the acceleration rate, in meters per second per second. If a car accelerates from a stop at the rate of 20 meters per second per second and travels a distance of 80 meters, about how many seconds did the car travel?

A. Between 1 and 2
B. Between 2 and 3
C. Between 3 and 4
D. 4
E. 8

32. Let a , b , c , and d be distinct positive integers. What is the 4th term of the geometric sequence below?

$$bcd, abc^2d, a^2bc^3d, \dots$$

F. a^3bc^4d
G. $a^3b^2c^3d$
H. $a^3b^2c^4d^2$
J. a^4bc^6d
K. a^4bc^9d

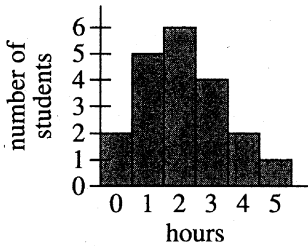
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Use the following information to answer questions 33–35.

DO YOUR FIGURING HERE.

A survey in a study skills class asked the 20 students enrolled in the class how many hours (rounded to the nearest hour) they had spent studying on the previous evening. The 20 responses are summarized by the histogram below.



33. What fraction of the students responded that they had spent less than 3 hours studying?
- A. $\frac{13}{100}$
 B. $\frac{1}{5}$
 C. $\frac{3}{10}$
 D. $\frac{13}{20}$
 E. $\frac{17}{20}$
34. The teacher decides to show the data in a circle graph (pie chart). What should be the measure of the central angle of the sector for 3 hours?
- F. 18°
 G. 20°
 H. 36°
 J. 72°
 K. 90°
35. To the nearest tenth of an hour, what is the average number of hours for the 20 survey responses?
- A. 2.0
 B. 2.1
 C. 2.3
 D. 2.5
 E. 3.0

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36. For all $x > 21$, $\frac{(x^2 + 8x + 7)(x - 3)}{(x^2 + 4x - 21)(x + 1)} = ?$

F. 1

G. $\frac{9}{7}$

H. $\frac{x-3}{x+3}$

J. $\frac{2(x-3)}{x+1}$

K. $\frac{4(x-3)}{x+1}$

DO YOUR FIGURING HERE.

37. The bottom of the basket of a hot-air balloon is parallel to the level ground. One taut tether line 144 feet long is attached to the center of the bottom of the basket and is anchored to the ground at an angle of 72° , as shown in the figure below. Which of the following expressions gives the distance, in feet, from the center of the bottom of the basket to the ground?

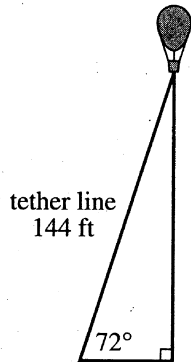
A. $\frac{144}{\cos 72^\circ}$

B. $\frac{144}{\sin 72^\circ}$

C. $144 \tan 72^\circ$

D. $144 \cos 72^\circ$

E. $144 \sin 72^\circ$



38. The coordinates of the endpoints of \overline{GH} , in the standard (x,y) coordinate plane, are $(-8,-3)$ and $(2,3)$. What is the x -coordinate of the midpoint of \overline{GH} ?

F. -6

G. -3

H. 0

J. 3

K. 5

39. On a map in the standard (x,y) coordinate plane, the towns of Arlington and Betelwood are represented by the points $(-2,-3)$ and $(-6,-7)$, respectively. Each unit on the map represents an actual distance of 10 miles. Which of the following is closest to the distance, in miles, between these 2 towns?

A. 128

B. 57

C. 42

D. 40

E. 28

GO ON TO THE NEXT PAGE.



40. Which of the following statements is true about rational and/or irrational numbers?

- F. The product of any 2 irrational numbers is irrational.
- G. The quotient of any 2 irrational numbers is rational.
- H. The product of any 2 rational numbers is irrational.
- J. The quotient of any 2 rational numbers is irrational.
- K. The sum of any 2 rational numbers is rational.

DO YOUR FIGURING HERE.

41. For the complex number i and an integer x , which of the following is a possible value of i^x ?

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

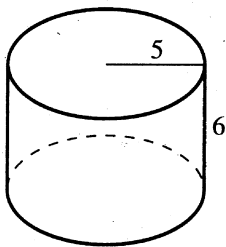
42. Consider the equation $y = (x - 3)^2 + 2$ where x and y are both real numbers. The table below gives the values of y for selected values of x .

x	y
-6	83
-4	51
-2	27
0	11
2	3
4	3
6	11

For the equation above, which of the following values of x gives the least value of y ?

- F. 1
- G. 2
- H. 3
- J. 4
- K. 5

43. The height and radius of the right circular cylinder below are given in meters. What is the volume, in cubic meters, of the cylinder?

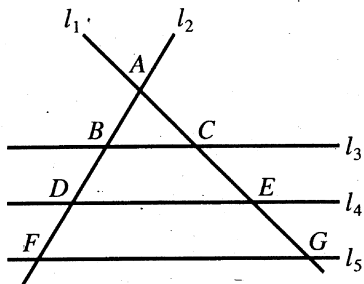


- A. 30π
- B. 31π
- C. 150π
- D. 180π
- E. 900π

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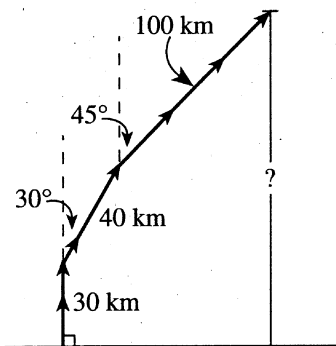
44. Lines l_1 and l_2 intersect each other and 3 parallel lines, l_3 , l_4 , and l_5 , at the points shown in the figure below. The ratio of the perimeter of $\triangle ABC$ to the perimeter of $\triangle AFG$ is 1:3. The ratio of DE to FG is 2:3. What is the ratio of AC to CE ?



DO YOUR FIGURING HERE.

- F. 1:1
G. 1:2
H. 1:3
J. 2:1
K. 3:1

45. A rocket lifted off from a launch pad and traveled vertically 30 kilometers, then traveled 40 kilometers at 30° from the vertical, and then traveled 100 kilometers at 45° from the vertical, as shown in the figure below. At that point, the rocket was how many kilometers above the height of the launch pad?



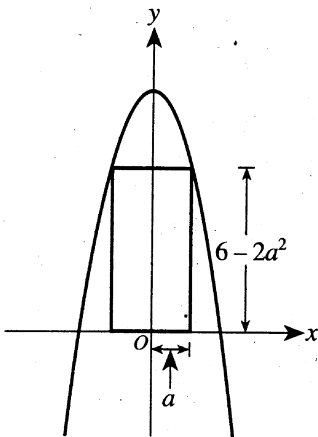
- A. 100
B. 170
C. 190
D. $20\sqrt{3} + 50\sqrt{2}$
E. $30 + 20\sqrt{3} + 50\sqrt{2}$
46. In the standard (x,y) coordinate plane, what is the area of the circle $x^2 + y^2 = 16$?
- F. 4π
G. 8π
H. 16π
J. 64π
K. 256π

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47. In the standard (x,y) coordinate plane below, 1 side of a rectangle is on the x -axis, and the vertices of the opposite side of the rectangle are on the graph of the parabola $y = 6 - 2x^2$. Let a represent any value of x such that $0 < x < \sqrt{3}$. Which of the following is an expression in terms of a for the area, in square coordinate units, of any such rectangle?

DO YOUR FIGURING HERE.



- A. $-4a^3 + 12a$
 B. $-2a^3 + 6a$
 C. $-4a^2 + 4a + 12$
 D. $-2a^2 + 2a + 6$
 E. $4a^4 - 24a^2 + 36$
48. If n is a positive integer, which of the following expressions must be an odd integer?
- F. 3^n
 G. n^3
 H. $3n$
 J. $\frac{n}{3}$
 K. $3 + n$
49. The value of $\log_5\left(5^{\frac{13}{2}}\right)$ is between which of the following pairs of consecutive integers?
- A. 0 and 1
 B. 4 and 5
 C. 5 and 6
 D. 6 and 7
 E. 9 and 10

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