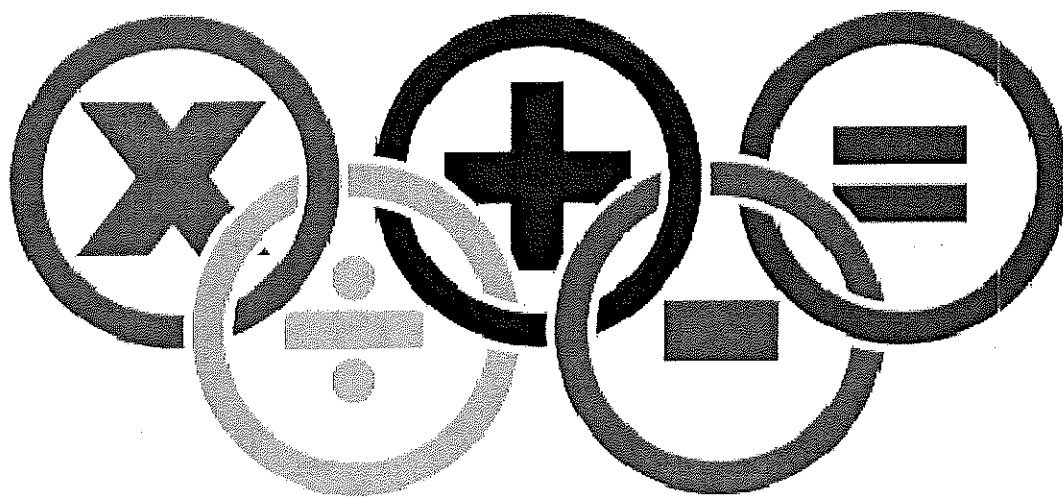


Number Sense & Operations



MCAS Practice Problems

Name _____ PD _____

1 Jessica wrote the equations below.

$$r = 27 \cdot n$$

$$s = 45 \cdot n$$

Which of the following expressions is equivalent to $s - r$?

- A. $(45 - 27)n$
- B. $45(27 - n)$
- C. $(45 - n)(27 - n)$
- D. $(45 - 27)(n - n)$

Mark your answer here: 1. (A)(B)(C)(D)

2 For all nonzero values of x and y , which of the following expressions **must** equal 0?

- A. $x^0(y^0)$
- B. $x^y - y^x$
- C. $xy - yx$
- D. $(x + y) + (x - y)$

Mark your answer here: 2. (A)(B)(C)(D)

3 What is the value of the expression below?

$$(\sqrt{7})^4$$

- A. 7
- B. 28
- C. 49
- D. 98

Mark your answer here: 3. (A)(B)(C)(D)



- 4 Which of the following is equivalent to the expression below for all real values of n and k ?

$$5^n \cdot 5^k$$

- A. 5^{n+k}
- B. 5^{n-k}
- C. 5^{nk}
- D. $5^{n \div k}$

Mark your answer here: 4. (A)(B)(C)(D)

- 5 Which of the following equations does **not** have a real number solution?

- A. $n + 1 = n$
- B. $n \cdot 1 = n$
- C. $n + 0 = n$
- D. $n - 0 = n$

Mark your answer here: 5. (A)(B)(C)(D)

- 6 Steve correctly multiplied 10 by its multiplicative inverse. Which of the following is the result of his multiplication?

- A. $\frac{1}{100}$
- B. $\frac{1}{10}$
- C. 1
- D. 10

Mark your answer here: 6. (A)(B)(C)(D)



- 7 What value of x makes the equation below true?

$$2^x = 8$$

- A. 2
- B. 3
- C. 4
- D. 6

Mark your answer here: 7. (A)(B)(C)(D)

- 8 What is the value of the expression below?

$$\sqrt{6^2 + 8^2}$$

- A. 10
- B. 14
- C. 28
- D. 50

Mark your answer here: 8. (A)(B)(C)(D)

- 9 Which of the following equations demonstrates the distributive property?

- A. $3x + 0 = 3x$
- B. $3(xy) = (3x)y$
- C. $3 + x = x + 3$
- D. $3(x + y) = 3x + 3y$

Mark your answer here: 9. (A)(B)(C)(D)



Directions: For the problem below, use a separate piece of paper to write your answers. Your teacher will not count anything you write on this page.

10

Let the operation \diamond be defined for all real numbers s and t as follows:

$$s \diamond t = s + t - 2$$

For example, $4 \diamond 8 = 4 + 8 - 2 = 10$.

- What is the value of $3 \diamond 5$? Show your work.
- What is the value of $7 \diamond (-11)$? Show your work.
- What is the value of y that makes the equation below true?

$$6 \diamond y = 6$$

Show or explain how you got your answer.

- Use the properties of operations on real numbers to show that $x \diamond y = y \diamond x$ for all real numbers x and y .

- 1 Which of the following is equivalent to the expression below?

$$100 \times 10^9$$

- A. 10^{10}
- B. 10^{11}
- C. 10^{12}
- D. 10^{18}

Mark your answer here: 1. (A)(B)(C)(D)

- 2 What is the value of the expression below?

$$2(3 + 2)^2 - (-1)^2$$

- A. 18
- B. 22
- C. 49
- D. 51

Mark your answer here: 2. (A)(B)(C)(D)

- 3 What is the value of the expression below?

$$|-3 - 8| - |5 - (-2)|$$

- A. -14
- B. -2
- C. 4
- D. 8

Mark your answer here: 3. (A)(B)(C)(D)



- 4 Based on the equation below, what is the value of y when $x = 5$?

$$y = 4(8 - x)^2$$

- A. 12
- B. 36
- C. 144
- D. 156

Mark your answer here: 4. (A)(B)(C)(D)

- 5 The approximate lengths of two major rivers are listed below.

- Nile River: 2.2×10^7 feet
- Snake River: 5.5×10^6 feet

Based on these lengths, the length of the Nile River is how many times the length of the Snake River?

- A. 0.4
- B. 2.5
- C. 4
- D. 25

Mark your answer here: 5. (A)(B)(C)(D)

- 6 Which of the following is equivalent to the expression below?

$$\sqrt{6} + \sqrt{6}$$

- A. $2\sqrt{6}$
- B. $\sqrt{12}$
- C. 6
- D. 12

Mark your answer here: 6. (A)(B)(C)(D)



7 What is the value of the expression below?

$$(3 \cdot 2)^2 - 3 \cdot 2^2$$

- A. 0
- B. 12
- C. 13
- D. 24

Mark your answer here: 7. (A)(B)(C)(D)

8 What whole number is equivalent to the expression below?

$$\sqrt{64 \cdot 100}$$

Write your answer here:

9 What is the value of the expression below?

$$3[1 + 2(1 + 2)]$$

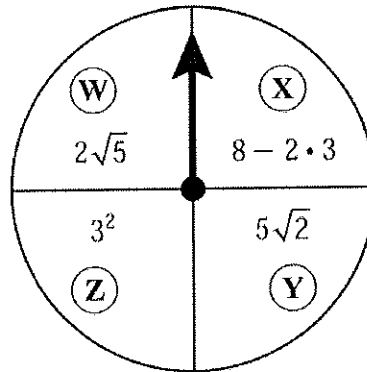
Write your answer here:



Directions: For the problem below, use a separate piece of paper to write your answers. Your teacher will not count anything you write on this page.

10

Thomas plays a number game using a spinner with four congruent sections. The sections are labeled W, X, Y, and Z, as shown below.



In the game, a player receives the number of points represented by the expression in the section where the arrow stops. The first player to get 20 points or more wins.

- a. During one game, Thomas needed 10 or more points to win. On his next spin the arrow stopped on section Z. Did he receive enough points to win? Show your work to justify your answer.
- b. Which is worth more points, section X or section Z? Show your work to justify your answer.
- c. Thomas believes section W and section Y are worth an equal number of points. Is Thomas correct? Explain your reasoning.



- 1 Which of the following is closest to the value of the expression below?

$$\sqrt{5^2 - 8}$$

- A. 1.4
- B. 2.2
- C. 4.1
- D. 8.5

Mark your answer here: 1. (A)(B)(C)(D)

- 2 A square has an area of 75 square meters. Which of the following is closest to the length of a side of the square?

- A. 7.8 meters
- B. 8.2 meters
- C. 8.7 meters
- D. 9.1 meters

Mark your answer here: 2. (A)(B)(C)(D)

- 3 The solutions of a quadratic equation are shown below.

$$4 \pm \sqrt{60}$$

Which of the following pairs of numbers is closest to the solutions of the equation?

- A. 11 and -3
- B. 12 and -4
- C. 19 and -11
- D. 34 and -26

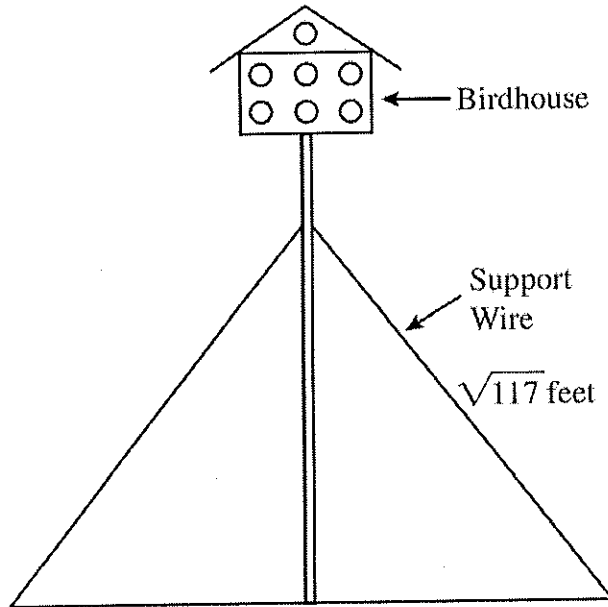
Mark your answer here: 3. (A)(B)(C)(D)



- 4 Kelly plans to build a birdhouse on top of a pole held upright with four support wires. The sketch below shows two of these support wires.

Mark your answer here: 4. (A)(B)(C)(D)

Kelly's Birdhouse



Kelly calculated that she would need $\sqrt{117}$ feet of wire for each support wire. Which of the following is closest to the value of $\sqrt{117}$?

- A. 10
- B. 11
- C. 59
- D. 60



5 Which of the following is closest to the value of $\sqrt{39}$?

Mark your answer here: 5. (A)(B)(C)(D)

- A. 5.7
- B. 6.2
- C. 6.7
- D. 7.1

6 What is the value of $\sqrt{51}$ to the nearest whole number?

Write your answer here:



1 Jonathan rents an office for his craft business. The rent is \$1.85 per square foot per month.

If Jonathan rents an office with an area of 320 square feet, which of the following estimates is closest to the cost of renting the office for 6 months?

- A. \$600
- B. \$800
- C. \$3600
- D. \$4200

Mark your answer here: 1. (A)(B)(C)(D)

2 During an event on Saturday, 29,089 seats in a sports arena were occupied. The arena has a total of 39,598 seats.

Which of the following estimates is closest to the fraction of seats that were occupied during the event on Saturday?

- A. $\frac{1}{10}$
- B. $\frac{1}{2}$
- C. $\frac{2}{3}$
- D. $\frac{3}{4}$

Mark your answer here: 2. (A)(B)(C)(D)



- 3** Felicity won a free round-trip airline ticket to California. She plans to go there for her vacation, but she must pay for everything herself except for the airline ticket. She estimated her vacation costs, as shown in the table below.

Mark your answer here: 3. (A)(B)(C)(D)

Felicity’s Estimated Vacation Costs

Expense	Estimated Cost
Hotel	\$140 per day
Meals	\$60 per day
All Other Expenses	\$400 during the entire trip

Felicity budgeted \$1000 to spend on all of her vacation costs. Which of the following can Felicity use to estimate the number of days she can stay in California without going over her budget?

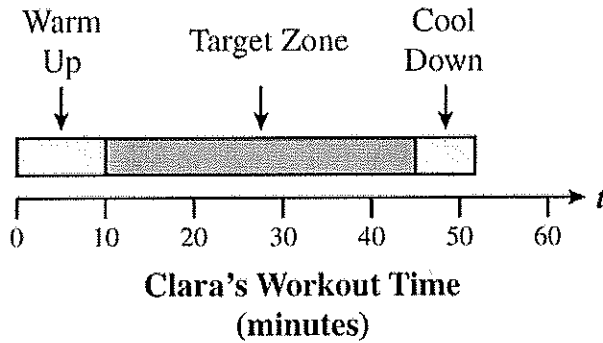
- A. $\frac{1000 - 400}{200}$
- B. $\frac{1000}{200} - 400$
- C. $\frac{1000 - 600}{400}$
- D. $\frac{1000}{600}$



- 5** Clara’s exercise bicycle has a graphic display that shows how much time she spent in the warm up, target zone, and cool down portions of her workout, as shown below.

Mark your answer here: 5. (A)(B)(C)(D)

Exercise Bicycle Display



According to the display, which of the following is closest to the percent of Clara’s workout time that was spent in the target zone?

- A. 35%
- B. 45%
- C. 70%
- D. 90%



- 6** Village Motors had total sales of \$86,571,394 last year. Of this amount, used-car sales were \$28,066,519.

Carlos correctly determined the percent of total sales that were used-car sales. Which of the following estimates is closest to the percent that he determined?

- A. 10%
- B. 25%
- C. 33%
- D. 50%

Mark your answer here: 6. (A)(B)(C)(D)

- 7** The charges to repair Naomi’s car are shown below.

Car Repair Charges

Labor	\$187.50
Parts	\$ 68.40
Towing	\$ 25.50

The charge for parts is closest to which percent of the total charges?

- A. 10%
- B. 25%
- C. 33%
- D. 50%

Mark your answer here: 7. (A)(B)(C)(D)



AREA FORMULAS

square $A = s^2$

rectangle $A = bh$

parallelogram $A = bh$

triangle $A = \frac{1}{2}bh$

trapezoid $A = \frac{1}{2}h(b_1 + b_2)$

circle $A = \pi r^2$

LATERAL SURFACE AREA FORMULAS

right rectangular prism $LA = 2(hw) + 2(lh)$

right circular cylinder $LA = 2\pi rh$

right circular cone $LA = \pi r\ell$
(ℓ = slant height)

right square pyramid $LA = 2s\ell$
(ℓ = slant height)

TOTAL SURFACE AREA FORMULAS

cube $SA = 6s^2$

right rectangular prism $SA = 2(lw) + 2(hw) + 2(lh)$

sphere $SA = 4\pi r^2$

right circular cylinder $SA = 2\pi r^2 + 2\pi rh$

right circular cone $SA = \pi r^2 + \pi r\ell$
(ℓ = slant height)

right square pyramid $SA = s^2 + 2s\ell$
(ℓ = slant height)

VOLUME FORMULAS

cube $V = s^3$
(s = length of an edge)

right rectangular prism $V = lwh$

OR

$V = Bh$
(B = area of a base)

sphere $V = \frac{4}{3}\pi r^3$

right circular cylinder $V = \pi r^2 h$

right circular cone $V = \frac{1}{3}\pi r^2 h$

right square pyramid $V = \frac{1}{3}s^2 h$

CIRCLE FORMULAS

$C = 2\pi r$

$A = \pi r^2$

SPECIAL RIGHT TRIANGLES

