

1.

Evaluate the following expression for $m = 9$.

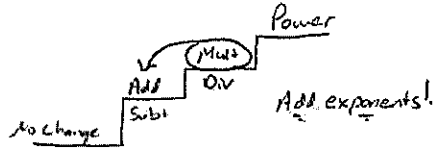
- A. 7
- B. 11
- C. 1
- D. 17

$$\begin{aligned} &\sqrt{4m} + 5 \\ &\sqrt{4(9)} + 5 \\ &\sqrt{36} + 5 \\ &6 + 5 \\ &\textcircled{11} \end{aligned}$$

2. Simplify the following expression.

- A. $8(12)$
- B. 8^7
- C. 812
- D. $8(7)$

$$\begin{aligned} &8^4 \cdot 8^3 \\ &8^{4+3} \\ &\textcircled{8^7} \end{aligned}$$



3. Simplify: $7\sqrt{54} - 2\sqrt{24}$

- A. $25\sqrt{6}$
- B. $9\sqrt{6}$
- C. $17\sqrt{6}$
- D. $55\sqrt{6}$

$$\begin{aligned} &7\sqrt{9\sqrt{6}} - 2\sqrt{4\sqrt{6}} \\ &7 \cdot 3\sqrt{6} - 2 \cdot 2\sqrt{6} \\ &21\sqrt{6} - 4\sqrt{6} \\ &\textcircled{17\sqrt{6}} \end{aligned}$$

4. The expression below should be further simplified for which value of x ?

- A. 185
 - B. 53
 - C. 74
 - D. 3
- $\sqrt{85x}$
- $\sqrt{85(185)}$
- $\sqrt{15725}$
- $\sqrt{25} \sqrt{629}$
- $5\sqrt{629}$
- It can be simplified if x is 185.*

$$\begin{array}{r} 185 \\ \times 85 \\ \hline 925 \\ + 14800 \\ \hline 15725 \end{array}$$

$$\begin{array}{r} 629 \\ 25 \overline{)15725} \\ \underline{150} \\ 72 \\ \underline{50} \\ 225 \end{array}$$

5. Factor the following polynomial completely.

$$-0.9x^2 - 4.5x + 12.6$$

$$-0.9(x^2 + 5x - 14)$$

$$\boxed{-0.9(x+7)(x-2)}$$

- A. $-0.9(x+7)(x+2)$
- B. $0.9(x+7)(x-2)$
- C. $-0.9(x^2+5x-14)$
- D. $-0.9(x+7)(x-2)$

6. Order the following from least to greatest.

0.6 0.14 0.77 0.50

$$\frac{2}{3}, 0.56, 14\%, 77\%, \frac{1}{2}$$

$$\boxed{14\%, \frac{1}{2}, 0.56, \frac{2}{3}, 77\%}$$

- A. $\frac{1}{2}, \frac{2}{3}, 0.56, 14\%, 77\%$
- B. $14\%, \frac{1}{2}, 0.56, \frac{2}{3}, 77\%$
- C. $14\%, \frac{1}{2}, \frac{2}{3}, 77\%, 0.56$
- D. $77\%, \frac{2}{3}, 0.56, \frac{1}{2}, 14\%$

7. The Rose Theater seats 146 people, and the theater is hosting a play for 8 nights. If the theater is at about 80% capacity for each night of the play, approximately how many people will attend the play?

80% of roughly 150 people

8 nights times roughly 120 people per night

- A. 1168
- B. 934
- C. 123
- D. 1176

$$.8(150)$$

$$8(120)$$

120 people per night

$$\boxed{\text{about } 960 \text{ people}}$$

8. Mick is participating in a cross county bike race. Every 2 hours he travels between 38 and 50 miles. Four hours ago, Mick had traveled 52 miles from the start of the race. Which is a reasonable measure of Mick's distance from the start of the race now?

- A. 158 miles
- B. 142 miles
- C. 166 miles
- D. 118 miles

Let's say Mick covers roughly 44 miles every 2 hours.

So, that'd be 88 miles in 4 hours.

$$\boxed{\text{about } 140 \text{ miles}}$$

Add that to the original 52 miles, and he's up to about 140 miles from the start.

9. Evaluate the following expression when $n = 2$.

$$2|3 - 6n| + |2|$$

$$2|3 - 6(2)| + 2$$

- A. 20 $2|3 - 12| + 2$
 B. 16 $2|-9| + 2$
 C. -20 $2(4) + 2$
 D. -16 $18 + 2$
(20)

10. Simplify the following expression.

$$\frac{3x^3 + 18x^2 - 15x}{3x}$$

$$\frac{3x^3}{3x} + \frac{18x^2}{3x} - \frac{15x}{3x}$$

- A. $3x^3 + 18x^2 - 5$
 B. $x^2 + 6x - 5$
 C. $19x^2 + 5x$
 D. $x^2 + 15x - 12$

$$\mathbf{(x^2 + 6x - 5)}$$

11. Simplify: $(7x^2 + 6x + 3) - (2x^2 - 3x + 7)$

- A. $9x^2 + 9x - 4$
 B. $5x^2 + 9x - 4$
 C. $9x^2 + 9x - 10$
 D. $5x^2 + 3x - 4$

$$7x^2 + 6x + 3 - 2x^2 + 3x - 7$$

$$\mathbf{(5x^2 + 9x - 4)}$$

12. Factor the following polynomial.

$$16x^2 + 20x$$

- A. $4x(4x + 20)$
 B. $4x^2(4x + 5)$
 C. $4x(4x + 5)$
 D. $4(4x + 5)$

$$\mathbf{(4x(4x + 5))}$$

13. Factor the following expression completely.

$$x^4 - 1$$

$$\frac{(x^2+1)(x^2-1)}{(x^2+1)(x+1)(x-1)}$$

- A. $(x-1)(x^3+1)$
- B. $(x-1)(x+1)(x^2+1)$
- C. $(x-1)(x+1)(x-1)(x+1)$
- D. $(x^2-1)(x^2+1)$

14. First State Bank has a drive-thru for customers who are making withdrawals or deposits. The drive-thru is open 5 days a week for 8 hours per day. Every hour, the bank serves 4 to 8 drive-thru customers. If two-thirds of drive-thru customers make a deposit, then about how many drive-thru customers will make a deposit in one work week?

- A. 160 drive-thru customers
- B. 80 drive-thru customers
- C. 20 drive-thru customers
- D. 224 drive-thru customers

The bank serves about 6 drive-thru customers an hour.

$\frac{2}{3}$ make a deposit, so that's $6 \times \frac{2}{3}$ which is 4 an hour.

4 customers per hour times 8 hours per day times 5 days per week makes about 160 customers.

15. Simplify: $4(13 - |-9 + 4|) - |9 - 7|^2$

- A. -4
- B. 28
- C. 43
- D. 16

$$\begin{aligned} &4(13 - |-9 + 4|) - |9 - 7|^2 \\ &4(13 - 5) - 2^2 \\ &4(8) - 4 \\ &32 - 4 \\ &\underline{28} \end{aligned}$$

16. Evaluate the following expression when $r = 3$ and $t = 2$.

- A. $\frac{4}{81}$
- B. -36
- C. $\frac{1}{2}$
- D. $\frac{1}{324}$

$$\begin{aligned} &(2 \times r^t)^{-2} \\ &(2 \times 3^2)^{-2} \\ &(2 \cdot 9)^{-2} \\ &18^{-2} \\ &\frac{1}{18^2} \\ &\underline{\frac{1}{324}} \end{aligned}$$

17. Simplify: $(6x^2 - 8x - 1)(2x - 5)$

$$12x^3 - 30x^2 - 16x^2 + 40x - 2x + 5$$

$$12x^3 - 46x^2 + 38x + 5$$

- A. $12x^3 - 46x^2 + 38x - 5$
- B. $12x^3 - 14x^2 - 42x + 5$
- C. $12x^3 + 14x^2 - 42x - 5$
- D. $12x^3 - 46x^2 + 38x + 5$

18. What is the greatest common factor (GCF) of the monomials shown below?

$$14x^3y^3z^2 \quad 22xy^2$$

- ① Biggest # that goes into each
- ② Smallest power of common variables.

- A. $2xy^2$
- B. $2x^3y^3z^2$
- C. $154x^4y^5z^2$
- D. $154x^3y^3z^2$

$$2xy^2$$

19. Look at the two monomials below.

$$6u^2v^2w^3 \quad 10u^3vw^4$$

- ① Smallest # that each goes into
- ② Largest power of each variable

What is the least common multiple (LCM) of the monomials shown above?

- A. $30u^3v^2w^4$
- B. $30u^5v^3w^7$
- C. $2u^5v^3w^7$
- D. $2u^2vw^3$

$$30u^3v^2w^4$$

20. Simplify the following expression.

$$\frac{2x^2 + 12x + 16}{2x^2 + 4x - 16}$$

$$\frac{2(x^2 + 6x + 8)}{2(x^2 + 2x - 8)}$$

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

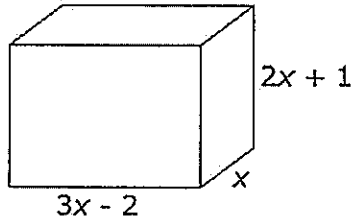
$$\frac{2(x+4)(x+2)}{2(x+4)(x-2)}$$

$$\frac{x+2}{x-2}$$

CONSTRUCTED-RESPONSE QUESTIONS

A1.1.1

1. Alena is packing a box that has a height of one inch more than twice the width and a length of two inches less than three times the width, as shown in the diagram below.



- A. Write a polynomial expression, in simplified form, that represents the volume of the box.

$$\begin{aligned}\text{Volume} &= \text{Length}(\text{width})(\text{Height}) \\ &= x(3x-2)(2x+1) \\ &= x(6x^2+3x-4x-2) \\ &= x(6x^2-x-2)\end{aligned}$$

→ $6x^3 - x^2 - 2x$ cubic units

Alena packs another box. This box has a square base with an area of $9x^2 - 6x + 1$ square inches.

- B. Write an expression to represent one side length of the base.

$$\begin{aligned}\text{Base Area} &= 9x^2 - 6x + 1 \\ &= (3x-1)(3x-1)\end{aligned}$$

Each side is $3x-1$ inches long

Alena has a third box whose height is the same as the first box, but whose volume is $6x^3 + 15x^2 + 6x$ cubic inches.

- C. Determine how much wider and longer this box is than the first box. Assume that the length of the box has a larger coefficient than the width. Show all your work. Explain why you did each step.

$$\begin{aligned} \text{Volume} &= 6x^3 + 15x^2 + 6x \\ &= 3x(2x^2 + 5x + 2) \\ &= 3x(2x+1)(x+2) \end{aligned}$$

↑ new length
 ↑ Height is the same
 ↑ new width

① I factored to find a variable expression for the length, width, and height.

② I compared the expressions for the new and old dimensions, and found that the new ones were 2 inches longer.

$$\begin{aligned} \text{Old length: } & 3x - 2 \\ \text{new length: } & 3x \end{aligned}$$

$$\begin{aligned} \text{new-old} \\ 3x - (3x - 2) \\ 3x - 3x + 2 \\ 2 \end{aligned}$$

The new is 2 inches longer than the old.

$$\begin{aligned} \text{Old width: } & x \\ \text{new width: } & x + 2 \end{aligned}$$

$$\begin{aligned} \text{new-old} \\ x + 2 - x \\ 2 \end{aligned}$$

The new is 2 inches wider than the old.