1. Simplify the expression.

   $(4 + i)(5 - 2i)$

   The simplified expression is _____ .
   (Type your answer in the form a + bi.)

2. Multiply and simplify.

   $\left(2 - 4\sqrt{7}\right)\left(8 + 3\sqrt{7}\right)$

   $\left(2 - 4\sqrt{7}\right)\left(8 + 3\sqrt{7}\right) =$ _____
   (Type an exact answer, using radicals as needed.)

3. Find the real solutions of the following equation by graphing.

   $x^3 - 7x^2 + 12x = 0$

   The solution(s) is/are _____ .
   (Use a comma to separate answers as needed.)

4. The volume of a sphere is a function of its radius, $V = \dfrac{4}{3}\pi r^3$. Evaluate the function for the volume of a volleyball with radius 11.5 cm.

   The volume is _____ cm^3. (Round to the nearest tenth as needed.)

*5. Simplify the expression.

   $\dfrac{12x^2 y^8}{2xy^3}$

   $\dfrac{12x^2 y^8}{2xy^3} =$ _____

6. Solve.

   $\sqrt{2x - 5} = 3$

   x = _____ (Simplify your answer. Use a comma to separate answers as needed.)

*7. Perform the addition.

   $\dfrac{5x}{x^2 - 3x - 4} + \dfrac{12}{x^2 - 11x + 28}$

   $\dfrac{5x}{x^2 - 3x - 4} + \dfrac{12}{x^2 - 11x + 28} =$ _____
   (Simplify your answer. Type your answer in factored form.)

*8. Simplify the expression. Write the result without using negative exponents. (Assume all variables represent nonzero real numbers.)

$$\left(r^2\right)^{-2}$$

$$\left(r^2\right)^{-2} = \underline{\hspace{2cm}}$$
(Type exponential notation with positive exponents.)

---

9. Solve the equation by factoring.

$$3x^2 + 17x - 46 = 0$$

$x = \underline{\hspace{2cm}}$

(Simplify your answer. Use a comma to separate answers as needed.)

---

10. Solve by the elimination method.

$$7x - 9y = 13$$
$$9x + 7y = 91$$

What is the solution of the system? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. $\underline{\hspace{2cm}}$ (Type an ordered pair.)

○ B. There are infinitely many solutions.

○ C. There is no solution.

---

11. Multiply and simplify. Assume that all variables are positive.

$$\sqrt{7x^7} \cdot \sqrt{8x^4}$$

$\sqrt{7x^7} \cdot \sqrt{8x^4} = \underline{\hspace{2cm}}$

(Simplify your answer. Type an exact answer, using radicals as needed.)

---

12. Solve the quadratic equation by completing the square.

$$x^2 - 2x = 1$$

$x = \underline{\hspace{2cm}}$

(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

---

13. Let $f(x) = 4x^2 + 10x + 4$ and $g(x) = x + 2$. Perform the function operation and then find the domain of the result.

$$(f \cdot g)(x)$$

$(f \cdot g)(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

What is the domain of $(f \cdot g)(x)$?

○ A. The domain of $f \cdot g$ is the set of all real numbers except $x = 0$.

○ B. The domain of $f \cdot g$ is the set of all real numbers.

○ C. The domain of $f \cdot g$ is the set of all $x \leq 0$.

○ D. The domain of $f \cdot g$ is the set of all $x \geq 0$.

---

14. Simplify the following number by using the imaginary number i.

$$\sqrt{-150}$$

$\sqrt{-150} = \underline{\hspace{2cm}}$

(Simplify your answer. Express complex numbers in terms of i. Type an exact answer, using radicals as needed.)

15. Multiply. State any restrictions on the variable.

$$\frac{x^2 - 7x + 12}{x^2 - 9} \cdot \frac{x^2 + 4x + 3}{x^2 - 3x - 4}$$

Simplify the rational expression.

$$\frac{x^2 - 7x + 12}{x^2 - 9} \cdot \frac{x^2 + 4x + 3}{x^2 - 3x - 4} = \underline{\hspace{2cm}} \quad \text{(Simplify your answer.)}$$

What are the restrictions on the variable? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $x \neq$ _____ (Use a comma to separate answers as needed.)

○ **B.** There are no restrictions on x.

16. The expression $2000(1.11)^t$ represents the value of a $2000 investment that earns 11% interest per year, compounded annually for t years. What is the value of a $2000 investment at the end of 2 years?

The value of the investment at the end of 2 years is $ _____ .
(Round to the nearest dollar as needed.)

17. Solve the equation.

$$n^2 + 7n + 12 = 0$$

n = _____
(Use a comma to separate answers as needed.)

18. Simplify. Assume that all variables are positive.

$$\sqrt{50x^{13}}$$

$\sqrt{50x^{13}} = $ _____
(Type an exact answer, using radicals as needed.)

19. Solve the equation using the Quadratic Formula.

$$x^2 - 5x - 3 = 0$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $x = $ _____
(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

○ **B.** There are no real solutions.

20. Rationalize the denominator. Simplify, if possible.

$$\frac{3}{\sqrt{2}+1}$$

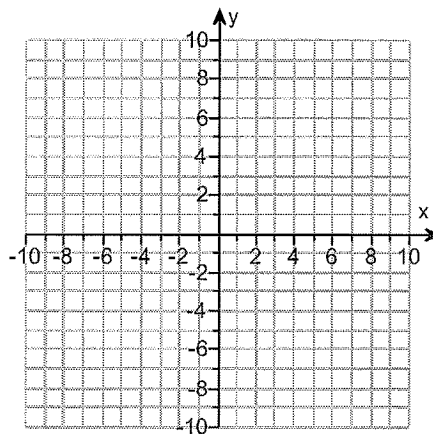$\dfrac{3}{\sqrt{2}+1} =$ _____ (Type an exact answer, using radicals as needed.)

---

21. Given $f(x) = 18x + 14$, find $f(7)$.

$f(7) =$ _____

---

22. Graph the inequality.

$y \leq 6x - 4$

Use the graphing tool on the right to graph the inequality.

---

*23. Divide and simplify.

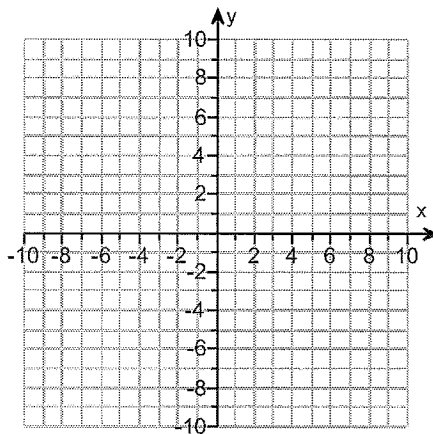$$\frac{x^2 - 16x + 64}{x^2 - 3x - 40} \div \frac{x^2 - 64}{3}$$

$\dfrac{x^2 - 16x + 64}{x^2 - 3x - 40} \div \dfrac{x^2 - 64}{3} =$ _____

---

24. Solve the system by graphing.

$$\begin{cases} 2x + 6y = 6 \\ x + y = -1 \end{cases}$$

Use the graphing tool to graph the system.

The solution of the system is _____ .
(Simplify your answer. Type an ordered pair.)

---

25. Multiply.

$(9 - \sqrt{5})(9 + \sqrt{5})$

The answer is _____ .

*26. Use the product rule to simplify the expression. Write the results using exponents.

$$\left(3z^{11}\right)\left(-6z^{7}\right)\left(z^{3}\right)$$

$$\left(3z^{11}\right)\left(-6z^{7}\right)\left(z^{3}\right) = \underline{\hspace{2cm}}$$

---

27. Rewrite the equation in vertex form.

$$y = x^2 + 4x + 1$$

$y = \underline{\hspace{2cm}}$

28.

What is $\dfrac{z^2 + 6z + 9}{z^2 - 4z - 21}$ in simplest form? State any restrictions on the variable.

The simplified form is $\underline{\hspace{2cm}}$.

What are the restrictions on the variable? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** $z \neq \underline{\hspace{2cm}}$ (Use a comma to separate answers as needed.)

○ **B.** There are no restrictions on z.

---

29. Express in terms of i.

$$\sqrt{-9}$$

$\sqrt{-9} = \underline{\hspace{2cm}}$

(Simplify your answer. Type your answer in the form $a + bi$.)

---

30. Simplify the following expression.

$$\sqrt{5}\left(\sqrt{5} + \sqrt{15}\right)$$

$\sqrt{5}\left(\sqrt{5} + \sqrt{15}\right) = \underline{\hspace{2cm}}$

(Simplify your answer. Type an exact answer, using radicals as needed.)

1. $22 - 3i$

2. $-68 - 26\sqrt{7}$

3. $0, 3, 4$

4. 6370.6

5. $6xy^5$

6. 7

7. $\dfrac{5x - 3}{(x + 1)(x - 7)}$

8. $\dfrac{1}{r^4}$

9. $2, -\dfrac{23}{3}$

10. A. _____**(7,4)**_____ (Type an ordered pair.)

11. $2x^5\sqrt{14x}$

12. $1 + \sqrt{2}, 1 - \sqrt{2}$

13. $4x^3 + 18x^2 + 24x + 8$

   B. The domain of f • g is the set of all real numbers.

14. $5i\sqrt{6}$

15. 1

   A. $x \neq$ ___**-3,3,4,-1**___ (Use a comma to separate answers as needed.)

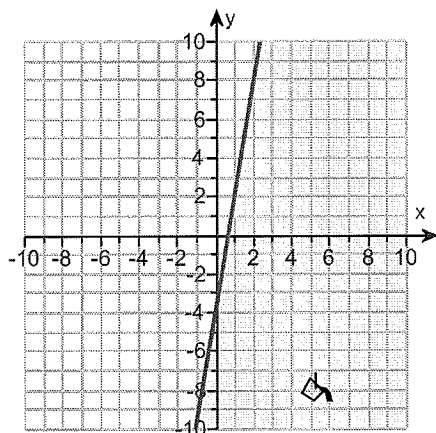16. 2464

17. $-3, -4$

18. $5x^6\sqrt{2x}$

19. A. $x = \dfrac{5 + \sqrt{37}}{2}, \dfrac{5 - \sqrt{37}}{2}$

(Simplify your answer. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)
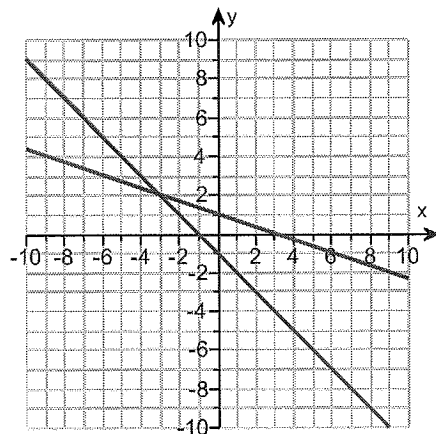
20. $-3 + 3\sqrt{2}$

21. 140

22.

23. $\dfrac{3}{(x + 5)(x + 8)}$

24.

$(-3, 2)$

25. 76

26. $-18z^{21}$

27. $(x+2)^2 - 3$

28. $\dfrac{z+3}{z-7}$

   A. $z \neq$ __**7, -3**__ (Use a comma to separate answers as needed.)

29. $3i$

30. $5 + 5\sqrt{3}$