

The maximum possible score for this exam is 100 points. Point-values for each problem are shown at the right in parenthesis.

Part I. Simplifying Skills

Factor the following completely.

1. $10x^2 + 7x - 12$

1. _____ (3)

2. $3x^2 - 48$

2. _____ (3)

Perform the indicated operation and simplify as much as possible.

3. $(5x^2 - 6x - 12) - (-3x^2 - 10x + 8)$

3. _____ (3)

4. $\frac{4}{3x} + \frac{1}{2}$

4. _____ (3)

5. $(3x - 2y)^2$

5. _____ (3)

6. $\frac{2}{x-1} + \frac{3}{2x-2}$

6. _____ (3)

Simplify the following. Write the final answer using positive exponents.

7. $\frac{x^{-3}y^2z^0}{3x^5y^{-7}}$

7. _____ (3)

8. Simplify $\sqrt{45x^3y^4}$ 8. _____ (3)

9. Write $\sqrt[3]{a^2}$ where $a \geq 0$ using an exponent. 9. _____ (2)

10. Evaluate $-x^2 - 2x$ if $x = 3$ 10. _____ (2)

Part II. Equations and Inequalities in One Variable

Solve the following equations. You must show your work to receive credit. No work – No credit.

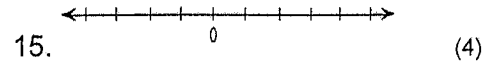
11. $(x + 5)^2 = 9$ 11. _____ (4)

12. $\frac{1}{x} + \frac{1}{3x} = 4$ 12. _____ (4)

13. $4^{1-2x} = 16$ 13. _____ (4)

14. $4\sqrt{x} = x + 3$ 14. _____ (4)

15. Solve the inequality $-4x > 2x + 12$ and graph the solution.

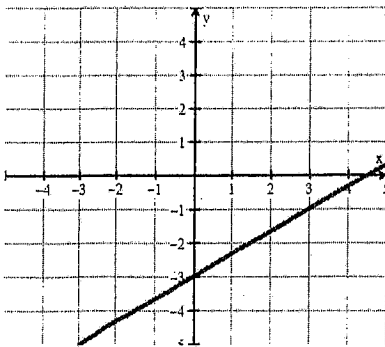


16. Solve $3x^2 - 6x - 24 = 0$ using the quadratic formula $\left(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right)$.

16. _____ (5)

Part III. Equations in Two variables

17. Below is a graph of a straight line.



- a. Estimate the slope. 17a. $m =$ _____ (1)
- b. Estimate the y - intercept. 17b. $y =$ _____ (1)
- c. Estimate the x - intercept. 17c. $x =$ _____ (1)
- d. If $y = -1$, find x . 17d. $x =$ _____ (1)

18. Find the slope of the line perpendicular to the line given by $3x + 2y = 8$.

18. $m =$ _____ (2)

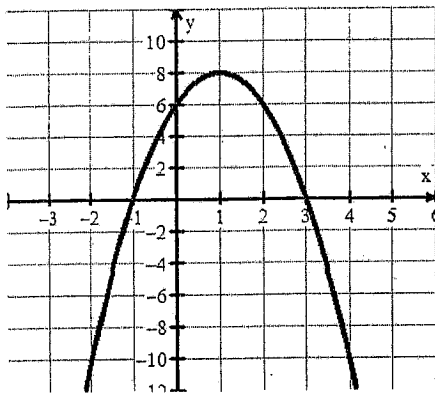
19. Solve the system $\begin{cases} x + 2y = 8 \\ x - y = -1 \end{cases}$ algebraically.

19. (____, ____) (4)

20. Find the distance between the points $P_1(-7, 5)$ and $P_2(-2, 1)$.
Round to the nearest tenth.

20. _____ (3)

21. Below is the graph of a quadratic equation in two variables. The general form of the equation is $y = ax^2 + bx + c$. Estimate to the nearest whole number the coordinates of the following.



21a. vertex: (____, ____) (1)

21b. y - intercept: (____, ____) (1)

21c. x - intercepts: (____, ____) (1)

(____, ____) (1)

21d. The value of c in the equation $y = ax^2 + bx + c$ is _____ (1)

21e. The value of a in the equation $y = ax^2 + bx + c$ is positive, negative, zero (1)
(circle one)

because _____ (1)

Part IV. Applications

22. The amount of money spent by insurance companies on health care expenses in the United States can be described by the equation $H = 58t + 370$ where H is in billions of dollars and t is number of years since 2000 ($t = 0$ for the year 2000).

a) How fast are health expenses rising? 22a. _____ (1) _____ (1)
amount units

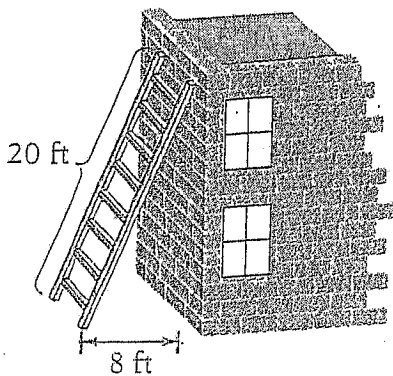
b) What were the health care expenses in 2000? 22b. _____ (1) _____ (1)
amount units

c) Find the healthcare expenses in 2007. 22c. _____ (2) _____ (1)
amount units

d) In what year did health care expenses reach 660 billion dollars?

22d. _____ (3)

23. A painter has a 20 foot ladder leaning against a building. How high on the building will the ladder reach if the bottom of the ladder is 8 feet from the base of the building? Round to the nearest foot.



23. _____ (3) _____ (1)
height units

24. In January a contractor buys 16 yards of nylon carpet and 20 yards of wool carpet for \$920. In February, at the same prices, he buys 18 yards of nylon carpet and 25 yards of wool carpet for \$1100. Let n be the price for each yard of nylon carpet and w the price for each yard of wool carpet.

- a) Write an equation involving n and w that represents the amount of money spent for carpeting in January.

26a. _____ (2)

- b) Write an equation involving n and w that represents the amount of money for carpeting in February.

26b. _____ (2)

25. A baseball is hit so that its height, h (in feet), t seconds after it is hit can be represented by the equation $h = -16t^2 + 56t + 4$.

- a) What is the height of the ball when it is hit?

25a. _____ (1) _____ (1)
height units

- b) What is the height of the ball 2 seconds after it is hit?

25b. _____ (2) _____ (1)
height units

26. An object is dropped from an airplane. The speed (in feet/seconds) of the object is given by the equation $v = \sqrt{64d}$ where v is the speed of the object and d is the distance (in feet) the object has fallen.

- a) What is the speed of the object when it has fallen 100 feet?

26a. _____ ft/sec (1)

- b) Find the distance the object has fallen when the speed reached 40 ft/sec.

27b. $d =$ _____ feet (3)