Directions: You have 115 minutes to complete this exam. There are 35 questions. Each multiple choice question is worth 5 points, each of the other questions is worth 6 points. (There is no partial credit on multiple choice questions). Partial credit is rare, but possible; so please show your work. Write your answers clearly, and use the space provided for the answer!

For problems 1 - 10, write the **letter** of the correct answer in the space provided. <u>Only one answer is correct.</u>

___ 1. Solve: $7 + 6x = 13 + 9x$.

   A) 4   B) –4   C) –8   D) –2   E) 2

___ 2. A computer bulletin board service charges a flat fee of $13 per month or a fee of $4 per month plus $0.12 for each minute the service is used. How many minutes must a person use this service to exceed $13?

   A) $\leq 75 \min$ B) $\leq 69 \min$ C) $< 69 \min$ D) $> 75 \min$ E) $\geq 75 \min$

___ 3. Factor: $64z^2a^2 - 9$.

   A) $(8za + 3)^2$

   B) Nonfactorable over the integers

   C) $(8za - 3)^2$

   D) $(3 + 8za)(3 - 8za)$

   E) $(8za + 3)(8za - 3)$

___ 4. Factor: $6a^3b + 30a^2b^2 + 12ab^2$.

   A) $6ab(a^2 + 5ab + 2b)$

   B) $6a^2b(a^2 + 5b + 2b)$

   C) $6ab(a^2 + 5a + 2b)$

   D) $6a^2b(a + 5ab + 2b)$

   E) $6a^2b^2(a + 5ab + 2)$

___ 5. Solve: $y^2 - 12y + 20 = 0$.

   A) $-2, 10$ B) No solution   C) $2, -10$ D) $2, 10$ E) $-2, -10$

___ 6. Find the equation of the line that passes through the points (5, 25) and (7, 33).

   A) $y = 4x + 9$ B) $y = 4x - 5$ C) $y = 4x + 5$ D) $y = 4x + 1$ E) $y = 4x - 1$

____ 7. Write as a fraction.

$$68\frac{3}{4}\%$$

    A) The percent cannot be expressed as a fraction.   B) $\dfrac{275}{4}$ C) $\dfrac{11}{16}$ D) $\dfrac{17}{4}$ E) $\dfrac{5}{16}$

____ 8. Simplify.

$$\frac{2y^{-3}z^{-7}}{6yz^{4}}$$

    A) $\dfrac{1}{3y^{4}z^{11}}$ B) $\dfrac{2}{6y^{4}z^{11}}$ C) $\dfrac{2y^{-2}z^{-3}}{6}$ D) $\dfrac{1}{3y^{-2}z^{-3}}$ E) $\dfrac{y^{-2}z^{-3}}{3}$

____ 9. A digital camera that regularly sells for \$105 is on sale for 10% off the regular price. Find the sale price.

    A) \$95.00   B) \$11.11   C) \$115.50   D) \$94.50   E) \$10.50

____ 10. Multiply: $\left(4y^{3}+4y^{2}+8\right)(8y-1)$.

    A) $12y^{4}+36y^{3}-4y^{2}+16y-8$ D) $12y^{4}+28y^{3}-4y^{2}+16y-8$

    B) $32y^{4}+32y^{3}-4y^{2}+8y-9$ E) $32y^{4}+12y^{3}-4y^{2}+64y-9$

    C) $32y^{4}+28y^{3}-4y^{2}+64y-8$

11. Find the area of a circle whose radius is 15.5 cm. Use 3.14 for π.

12. Factor: $b^{2}-6b+9$.

13. An investment counselor recommends investing 30% of a client's cash in retirement account earning 9% annual simple interest. The remainder of the cash was placed in a municipal bonds account that yields 5% annual simple interest. The total annual interest earned from the two investments was $1798. Find the total amount invested.

14. A tea that is 20% jasmine is blended with a tea that is 12% jasmine.

How many pounds of the 12% jasmine tea are used to make 10 lb of tea that is 16% jasmine?

15. **Geometry.** The length of a rectangle is 7 in. more than twice its width. Its area is 114 in². Find the width of the rectangle.

16. Given that $l_1 \parallel l_2$, find x.
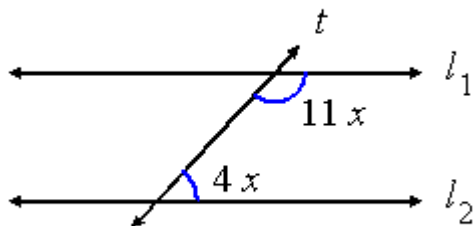
17. Factor: $s^2 - 10sr + 21r^2$.

18. Solve: $4a - \dfrac{1}{3} \le 3a + \dfrac{1}{4}$.

19. Graph by using x- and y-intercepts.
$$5x - 3y = -15$$
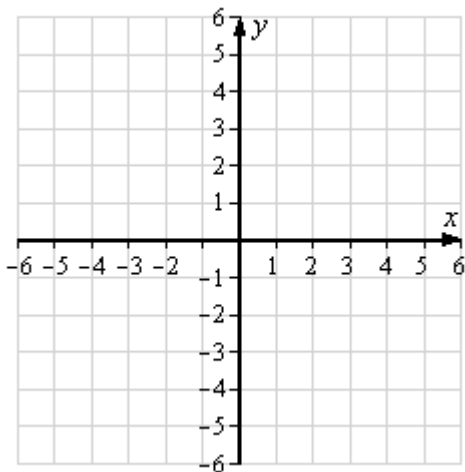
20. State whether or not the relation is a function.
$$\{(-9,3),(-8,1),(-5,0),(-8,-3)\}$$

21. Factor: $6y^2 - 48y + 72$.

22. Evaluate the following expression using the Order of Operations Agreement.
$$-12^2 + 5[8 \div (13 - 11)]$$

23. Solve: $\dfrac{1}{2}x - 6 = 4$.

24. Factor by grouping: $2a^2 + 7a - 15$.

25. Find three consecutive even integers whose sum is negative sixty-six.

26. Simplify: $\left(5m^{-4}y^{-3}\right)^2$.

27. Multiply: $(3y+7)(3y-7)$.

28. Divide: $\dfrac{2z^{10}-2z^{7}-3z^{5}}{z^{3}}$.

29. Simplify: $\left(-x^{2}z^{3}\right)^{4}$.

30. Solve by substitution:

$$y \;=\; -5x \;+\; 3$$
$$y \;=\; 2x \;-\; 4$$

31. Graph the solution set.

$$2x - 3y \geq -6$$
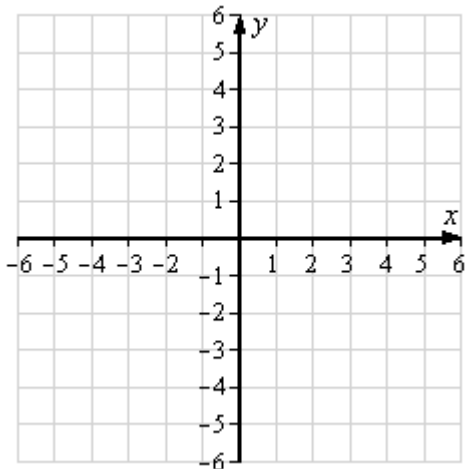
32. A small plane, flying into a headwind, flew 500 miles in 7 h. Flying with the wind, the plane traveled 1660 miles in 5 h. Find the rate of the plane in calm air and the rate of the wind. Round your answer to nearest whole number.

33. Multiply: $(z-5)^2$.

34. Solve by the addition method:

$$22x + 48y = 25$$
$$11x + 48y = 20$$
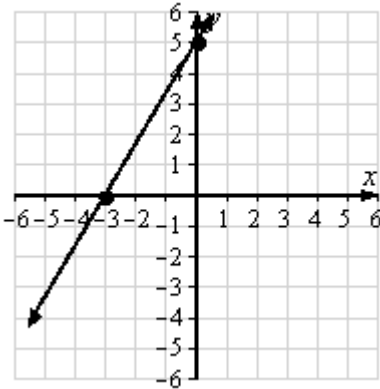
35. Divide: $\left(2t^2 - 6t - 3\right) \div \left(t - 4\right)$.

Answer Key

1. D
2. D
3. E
4. A
5. D
6. C
7. C
8. A
9. D
10. C
11. 754.385 cm²

12. $(b-3)^2$
13. $29,000
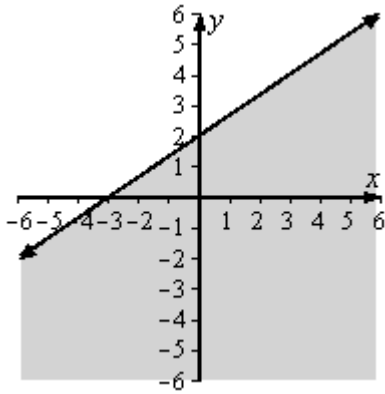14. 5 lb
15. 6 in.
16. 12°

17. $(s-7r)(s-3r)$
18. $a \le \dfrac{7}{12}$
19.

20. no
21. $6(y-6)(y-2)$
22. –124
23. 20
24. $(a+5)(2a-3)$
25. –24, –22, –20
26. $\dfrac{25}{m^8 y^6}$

Grading: (4p) No partial credit.
27. $9y^2 - 49$

Grading: (4p) No partial credit.
28. $2z^7 - 2z^4 - 3z^2$
29. $x^8 z^{12}$
30. (1, –2)

31.

32. plane: 180 mph; wind: 109 mph

33. $z^2 - 10z + 25$

34. $\left(\dfrac{5}{11}, \dfrac{5}{16} \right)$

35. $2t + 2 + \dfrac{5}{t-4}$