

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Factor completely.

1) $81x^2 - 4$ 1) _____

2) $10m^7 + 6m^5 - 20m^2$ 2) _____

3) $4x(2x - 3) + 3(2x - 3)$ 3) _____

4) $3m(4 - m) + 2n(4 - m)$ 4) _____

5) $x^3 + 7x^2 - 5x - 35$ 5) _____

6) $x^2 + 5xy - 14y^2$ 6) _____

7) $y^2 - 100$ 7) _____

8) $5x^2 + 35x$ 8) _____

9) $x^2 - x - 56$ 9) _____

10) $49x^2 - 36$ 10) _____

11) $6x^2 - 6x - 36$ 11) _____

12) $u^2 - 6uv - 16v^2$ 12) _____

$$13) x^3 - 3x^2 - 5x + 15$$

13) _____

$$14) x^2 - 2x - 15$$

14) _____

Find all numbers for which the rational expression is not defined.

$$15) \frac{2}{a-5}$$

15) _____

$$16) \frac{d-9}{6-d}$$

16) _____

$$17) \frac{c-3}{6}$$

17) _____

Simplify.

$$18) \frac{50m^3p^2}{2m^{10}p}$$

18) _____

$$19) \frac{a^2 - 3a}{(a+8)(a-3)}$$

19) _____

$$20) \frac{y^2 + 4y - 45}{y^2 + 18y + 81}$$

20) _____

$$21) \frac{y^2 + 7y - 18}{y^2 + 5y - 36}$$

21) _____

Multiply and, if possible, simplify.

$$22) \frac{5x^2}{7} \cdot \frac{42}{x^3}$$

22) _____

$$23) \frac{7p-7}{p} \cdot \frac{4p^2}{8p-8}$$

23) _____

$$24) \frac{k^2 + 8k + 15}{k^2 + 12k + 35} \cdot \frac{k^2 + 7k}{k^2 + 8k + 15}$$

24) _____

$$25) \frac{2z^3}{4} \cdot \frac{28}{z^2}$$

25) _____

Find the reciprocal.

$$26) \frac{t+6}{t-11}$$

26) _____

$$27) 9y^2 + 8y$$

27) _____

Find fractional notation for the ratio. You need not simplify.

28) A baseball team has played 8 games so far this season. The team won 6 games. What is the ratio of games won to games played so far?

28) _____

Divide and, if possible, simplify.

$$29) \frac{2x^2}{3} \div \frac{x^3}{9}$$

29) _____

$$30) \frac{x^2 - 81}{x} \div \frac{6x + 54}{x - 9}$$

30) _____

$$31) \frac{z^2 + 11z + 30}{z^2 + 14z + 48} \div \frac{z^2 + 5z}{z^2 + 13z + 40}$$

31) _____

Find fractional notation for the ratio. You need not simplify.

- 32) In a three-point shooting contest, a basketball player attempted 20 shots and made 7 of them. Find the ratio of shots made to shots missed. 32) _____

Find the indicated rate.

- 33) Tim's car will go 553.5 miles on 20.5 gallons of gasoline in city driving. What is the rate in miles per gallon? 33) _____
- 34) While walking, Joe's heart beats 2544 times in 30 minutes. What is the rate in beats per minute? 34) _____
- 35) Last basketball season, Danny scored 943 points in 76 games. What was the rate in points per game? Round to the nearest tenth if necessary. 35) _____

Solve the problem.

- 36) The trim for a costume costs \$11.25 for 4.5 yd. Find the unit price in dollars per yard. 36) _____

Find fractional notation for the ratio. You need not simplify.

- 37) At an advertising agency that employs 289 people, 102 employees receive 3 weeks of paid vacation each year. What is the ratio of those who receive 3 weeks of paid vacation to the total number of employees? 37) _____

Use a proportion to solve the problem.

- 38) The ratio of the height to the width of a packaging label is 5 to 19. If the height of the label is 4 inches, what is its width? 38) _____
- 39) A label printer prints 3 pages of labels in 1.6 seconds. How long will it take to print 12 pages of labels? 39) _____
- 40) The ratio of the lengths of strings that play the notes F and G is 9 to 8. If a string 80 centimeters long plays a G, what is the length of the string that plays an F? 40) _____

Find all square roots of the number.

- 41) 256 41) _____

42) 484

42) _____

Evaluate the square root, if possible.

43) $\sqrt{144}$

43) _____

44) $-\sqrt{289}$

44) _____

45) $\sqrt{-36}$

45) _____

46) $\sqrt{\frac{36}{25}}$

46) _____

Classify the number as rational or irrational.

47) $\sqrt{25}$

47) _____

48) $\sqrt{105}$

48) _____

49) $\sqrt{18}$

49) _____

Find all square roots of the number.

50) 49

50) _____

Answer Key

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- 1) $(9x + 2)(9x - 2)$
- 2) $2m^2(5m^5 + 3m^3 - 10)$
- 3) $(4x + 3)(2x - 3)$
- 4) $(3m + 2n)(4 - m)$
- 5) $(x + 7)(x^2 - 5)$
- 6) $(x + 7y)(x - 2y)$
- 7) $(y + 10)(y - 10)$
- 8) $5x(x + 7)$
- 9) $(x + 7)(x - 8)$
- 10) $(7x + 6)(7x - 6)$
- 11) $6(x + 2)(x - 3)$
- 12) $(u + 2v)(u - 8v)$
- 13) $(x - 3)(x^2 - 5)$
- 14) $(x + 3)(x - 5)$
- 15) $a = 5$
- 16) $d = 6$
- 17) None
- 18) $\frac{25p}{m^7}$
- 19) $\frac{a}{a + 8}$
- 20) $\frac{y - 5}{y + 9}$
- 21) $\frac{y - 2}{y - 4}$
- 22) $\frac{30}{x}$
- 23) $\frac{7p}{2}$
- 24) $\frac{k}{k + 5}$
- 25) $14z$
- 26) $\frac{t - 11}{t + 6}$
- 27) $\frac{1}{9y^2 + 8y}$
- 28) $\frac{6}{8}$
- 29) $\frac{6}{x}$
- 30) $\frac{(x - 9)^2}{6x}$
- 31) $\frac{z + 5}{z}$

Answer Key

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32) $\frac{7}{13}$

33) 27 mpg

34) 84.8 beats/min

35) 12.4 points/game

36) \$2.50 per yd

37) $\frac{102}{289}$

38) 15.2 in.

39) 6.40 sec

40) 90 cm

41) ± 16

42) ± 22

43) 12

44) - 17

45) Not real

46) $\frac{6}{5}$

47) Rational

48) Irrational

49) Irrational

50) ± 7