

Chapter 4 - Factors and Fractions - Mid-Chapter Quiz - Lessons 4-1 through 4-4

1. **ALGEBRA** Evaluate $b^2 - 4ac$ if $a = -1$, $b = 5$, and $c = 3$.

$$\begin{aligned} b^2 - 4ac &= 5^2 - [4(-1)(3)] \\ &= 25 - (-12) \\ &= 25 + 12 \\ &= 37 \end{aligned}$$

2. **MULTIPLE CHOICE** The number of acres consumed by a forest fire triples every two hours. Which expression represents the number of acres consumed after 1 day?

Hours	2	4	6	8	10
Acres Consumed	3^1	3^2	3^3	3^4	3^5

- A 310 acres
 B 312 acres
 C 318 acres
 D 324 acres

The number of acres consumed after n hours is $3^{n/2}$. So, after 24 hours, $3^{24/2} = 3^{12}$ acres will have burned.

The correct answer is B.

LITERATURE In a story, a knight received a reward for slaying a dragon. He received 1 cent on the first day, 2 cents on the second day, 4 cents on the third day, and so on, continuing to double the amount for 30 days.

3. Write his reward on each of the first three days as a power of 2.

$$2^0, 2^1, 2^2$$

4. Write his reward on the 8th day as a power of 2. Then evaluate.

$$\begin{aligned} 2^7 &= 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\ &= 128 \text{ cents} \end{aligned}$$

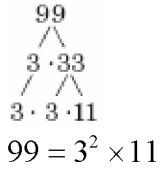
Write the prime factorization of each number. Use exponents for repeated factors.

5. 42

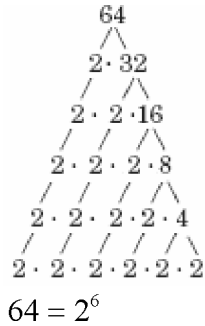
$$\begin{array}{c} 42 \\ \swarrow \quad \searrow \\ 2 \cdot 21 \\ \swarrow \quad \searrow \quad \swarrow \quad \searrow \\ 2 \cdot 3 \cdot 7 \end{array}$$

$$42 = 2 \times 3 \times 7$$

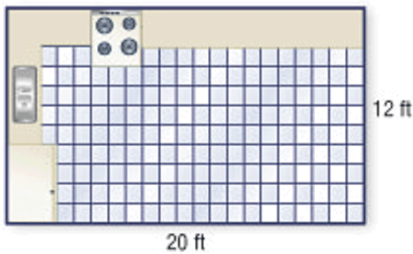
6. 99



7. 64



8. **MULTIPLE CHOICE** A kitchen floor with the dimensions shown is to be tiled. If the tiles are only available in dimensions that are prime numbers, which set of tile dimensions could NOT be used to tile the floor?



- F 2 ft by 2 ft
- G 2 ft by 3 ft
- H 2 ft by 5 ft
- J 3 ft by 3 ft

20 is not divisible by 3.
 So, 3 ft by 3 ft tiles will not be able to tile the whole length of the floor.
 The correct answer is J.

Factor each monomial.

9. $77x$

$$77x = 7 \cdot 11 \cdot x$$

10. $18st$

$$18st = 2 \cdot 3 \cdot 3 \cdot s \cdot t$$

11. $-23n^3$

$$-23n^3 = -1 \cdot 23 \cdot n \cdot n \cdot n$$

12. $30cd^2$

$$30cd^2 = 2 \cdot 3 \cdot 5 \cdot c \cdot d \cdot d$$

Name: School: Grade: Class:

13. **BAKE SALE** Joanna baked 81 cookies and 54 cupcakes for the bake sale. She wants to place the same number of cookies and the same number of cupcakes in a plastic bag. What is the maximum number of bags that she can make if she uses all of the cookies and cupcakes?

The problem is equivalent to finding the GCF of 81 and 54.

$$81 = 3 \cdot 3 \cdot 3 \cdot 3$$

$$54 = 2 \cdot 3 \cdot 3 \cdot 3$$

The GCF is $3 \cdot 3 \cdot 3$ or 27.

So, the maximum number of bags she can make is 27 with each bag containing 3 cookies and 2 cupcakes..

Find the GCF of each set of numbers or monomials.

14. 18, 45

$$18 = 2 \cdot 3 \cdot 3$$

$$45 = 3 \cdot 3 \cdot 5$$

The GCF is $3 \cdot 3$ or 9.

15. 22, 21

$$22 = 2 \cdot 11$$

$$21 = 3 \cdot 7$$

The GCF is 1.

16. 16, 40

$$16 = 2 \cdot 2 \cdot 2 \cdot 2$$

$$40 = 2 \cdot 2 \cdot 2 \cdot 5$$

The GCF is $2 \cdot 2 \cdot 2$ or 8.

17. 10, $12m$

$$10 = 2 \cdot 5$$

$$12m = 2 \cdot 2 \cdot 3 \cdot m$$

The GCF is 2.

18. $3x$, $18x^2$

$$3x = 3 \cdot x$$

$$18x^2 = 2 \cdot 3 \cdot 3 \cdot x \cdot x$$

The GCF is $3 \cdot x$ or $3x$.

19. $15g$, $35h$

$$15g = 3 \cdot 5 \cdot g$$

$$35h = 5 \cdot 7 \cdot h$$

The GCF is 5.

Factor each expression.

Name: School: Grade: Class:

20. $9s + 18$

$$9s = 3 \cdot 3 \cdot s$$

$$18 = 2 \cdot 3 \cdot 3$$

The GCF is $3 \cdot 3$ or 9.

$$\begin{aligned} 9s + 18 &= 9(s) + 9(2) \\ &= 9(s + 2) \end{aligned}$$

21. $6y + 21$

$$6y = 2 \cdot 3 \cdot y$$

$$21 = 3 \cdot 7$$

The GCF is 3.

$$\begin{aligned} 6y + 21 &= 3(2y) + 3(7) \\ &= 3(2y + 7) \end{aligned}$$

22. $60 + 15h$

$$60 = 2 \cdot 2 \cdot 3 \cdot 5$$

$$15h = 3 \cdot 5 \cdot h$$

The GCF is $3 \cdot 5$ or 15.

$$\begin{aligned} 60 + 15h &= 15(4) + 15(h) \\ &= 15(4 + h) \end{aligned}$$

23. $9z - 99$

$$9z = 3 \cdot 3 \cdot z$$

$$99 = 3 \cdot 3 \cdot 11$$

The GCF is 9.

$$\begin{aligned} 9z - 99 &= 9(z) - 9(11) \\ &= 9(z - 11) \end{aligned}$$

24. $21x - 63$

$$21x = 3 \cdot 7 \cdot x$$

$$63 = 3 \cdot 3 \cdot 7$$

The GCF is $3 \cdot 7$ or 21.

$$\begin{aligned} 21x - 63 &= 21(x) - 21(3) \\ &= 21(x - 3) \end{aligned}$$

25. $18 - 12a$

$$18 = 2 \cdot 3 \cdot 3$$

$$12a = 2 \cdot 2 \cdot 3 \cdot a$$

The GCF is $2 \cdot 3$ or 6.

$$\begin{aligned} 18 - 12a &= 6(3) - 6(2a) \\ &= 6(3 - 2a) \end{aligned}$$

Name: School: Grade: Class:

26. **MULTIPLE CHOICE** Three hundred thirty yards is what part of 1 mile?

A $\frac{1}{16}$

B $\frac{1}{8}$

C $\frac{3}{16}$

D $\frac{1}{4}$

There are 1760 yards in 1 mile.

$$\frac{330}{1760} = \frac{\cancel{2}^1 \cdot 3 \cdot \cancel{5}^1 \cdot \cancel{11}^1}{\cancel{2}^1 \cdot \cancel{5}^1 \cdot \cancel{11}^1 \cdot 16}$$
$$= \frac{3}{16}$$

The correct answer is C.

ALGEBRA Simplify each fraction. If the fraction is already in simplest form, write *simplified*.

27. $\frac{x^2}{x^3}$

$$\frac{x^2}{x^3} = \frac{\cancel{x}^1 \cdot \cancel{x}^1}{\cancel{x}^1 \cdot \cancel{x}^1 \cdot x}$$
$$= \frac{1}{x}$$

28. $\frac{27n^2}{15}$

$$\frac{27n^2}{15} = \frac{\cancel{3}^1 \cdot 3 \cdot 3 \cdot n \cdot n}{\cancel{3}^1 \cdot 5}$$
$$= \frac{9n^2}{5}$$

29. $\frac{5c^3d}{20d^2}$

$$\frac{5c^3d}{20d^2} = \frac{\cancel{5}^1 \cdot c \cdot c \cdot c \cdot \cancel{d}^1}{2 \cdot 2 \cdot \cancel{d}^1 \cdot \cancel{d}^1}$$
$$= \frac{c^3}{4d}$$

Name: School: Grade: Class:

30. **ANIMALS** The table shows the average amount of food each animal can eat in a day and its average weight. What fraction of its weight can each animal eat per day?

Animal	Daily Amount of Food	Weight of Animal
elephant	450 lb	9000 lb
hummingbird	2 g	3 g
polar bear	25 lb	1500 lb
tiger	20 lb	500 lb

Source: *Animals as Our Companions, Wildlife Fact File*

Elephant:

$$\frac{450}{9000} = \frac{\overset{1}{\cancel{450}}}{\underset{1}{\cancel{450}} \cdot 20} = \frac{1}{20}$$

Hummingbird:

$$\frac{2}{3}$$

Polar Bear:

$$\frac{25}{1500} = \frac{\overset{1}{\cancel{25}}}{\underset{1}{\cancel{25}} \cdot 60} = \frac{1}{60}$$

Tiger:

$$\frac{20}{500} = \frac{\overset{1}{\cancel{20}}}{\underset{1}{\cancel{20}} \cdot 25} = \frac{1}{25}$$