LESSON

31 Pairs of Lines

WARM-UP

Facts Practice: 64 Multiplication Facts (Test F)

Mental Math: How many days are in a leap year? … in a common year? Count by 12's from 12 to 84. Count by 5's from 3 to 53.

a. How many is 2 dozen? … 3 dozen? … 4 dozen?

b. 48 + 25 **c.** 1200 + 340 **d.** 50% of 20

e. 25% of 20 **f.** 10% of 20 **g.** 7 × 32

h. 4 × 9, − 1, ÷ 5, + 1, × 4

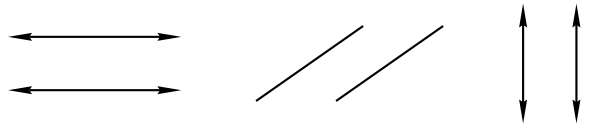
Problem Solving:

Copy this multiplication problem and fill in the missing digits:

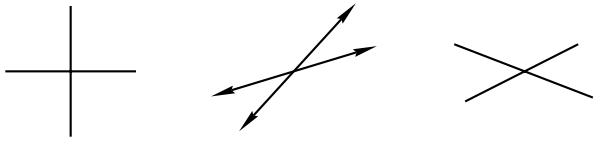
$$\begin{array}{r} 45 \\ \times\ \_ \\ \hline \_0 \end{array}$$

NEW CONCEPT

When lines cross we say that they **intersect.** If we draw two straight lines on the same flat surface, then those lines either intersect at some point or they do not intersect at all. Lines that go in the same directions and do not intersect are called **parallel lines.** Parallel lines always stay the same distance apart. Thinking of train tracks can give us the idea of parallel lines. Here are pairs of parallel lines and parallel line segments:



Lines on the same surface that are not parallel are called **intersecting lines.** Here are pairs of intersecting lines and intersecting line segments:



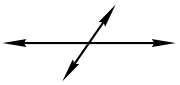
The pair of segments on the left are **perpendicular.** Perpendicular lines and segments intersect to form "square corners." The other two pairs of lines and segments are **oblique.** Oblique lines and segments are neither parallel nor perpendicular.

Activity: *Parallel and Perpendicular Segments*

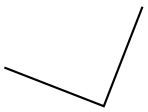
For this activity, work with a partner (who may be your teacher). Draw a line segment. Then have your partner draw two line segments, one parallel to your segment and the other perpendicular to it. Repeat the activity, switching roles with your partner.

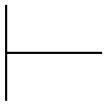
Example 1 Draw a pair of oblique lines.

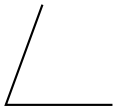
Solution We draw two lines that intersect but that do not form square corners. Many arrangements are possible.



Example 2 Which of the following figures does *not* appear to contain perpendicular segments?

A. 

B. 

C. 

D. 

Solution Perpendicular segments intersect to form square corners. The segments in A appear to be perpendicular. (You may need to turn your book slightly to help you see this.) The segments in B and D also appear to be perpendicular. The segments that do not appear to be perpendicular are those in choice **C.**

LESSON PRACTICE

Practice set

a. Draw two parallel segments.

b. Draw two perpendicular lines.

c. Draw two oblique segments.

MIXED PRACTICE

Problem set

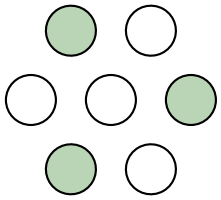
1. (31) Draw a pair of intersecting lines that are perpendicular.

2. (16) Lani bought a kaleidoscope for $4.19. If she paid for it with a $10 bill, how much money should she get back? Write a subtraction pattern and solve the problem.

3. (21, 28) How many hours are there in 7 days?

4. (11) From 6:00 a.m. to 4:00 p.m. the temperature rose 23° to 71°F. What was the temperature at 6:00 a.m.? Write an addition pattern and solve the problem.

5. (30) What fraction of this group is shaded?



6. (25) List the factors of 19.

7. (13)
$$\begin{array}{r} \$16.38 \\ -\ \$\ 9.47 \\ \hline \end{array}$$

8. (14)
$$\begin{array}{r} 1000 \\ -\quad Q \\ \hline 576 \end{array}$$

9. (26) $5n = 280$

10. (29)
$$\begin{array}{r} 476 \\ \times\ \ 80 \\ \hline \end{array}$$

11. (29)
$$\begin{array}{r} \$9.68 \\ \times\ \ 60 \\ \hline \end{array}$$

12. (26) $\dfrac{\$19.44}{8}$

13. (28) Write the time that is thirty minutes before midnight.

14. (Inv. 2) Compare: $\frac{1}{10}$ of 100 ◯ $\frac{1}{2}$ of 20

15. (13, 17) Jackson bought five boxes of his favorite cereal for $2.87 each. Altogether, how much did the five boxes of cereal cost? Change this addition problem to a multiplication problem and find the total:

$$\$2.87 + \$2.87 + \$2.87 + \$2.87 + \$2.87$$

16. (10, 13) $\$96 + \$128.13 + \$27.49 + W = \$300$

17. (24, 26) $328 \div (32 \div 8)$

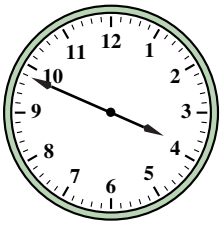
18. (24) $648 - (600 + 48)$

19. *(2)* Think of an odd number. Multiply it by 2. Now add 1. Is the final answer odd or even?

20. *(25)* Which of these numbers has neither 2 nor 5 as a factor?

A. 125 B. 251 C. 512 D. 215

21. *(28)* It is afternoon. What time is shown by this clock?



22. *(Inv. 2)* What number is the numerator of the fraction $\frac{2}{3}$?

23. *(7)* Use words to name the number 123,400.

24. *(Inv. 3)* What percent of a circle is $\frac{2}{3}$ of a circle?

25. *(27)* Copy this number line, and draw an arrow that points to the location of the number 75.

26. *(26)* Show how to check this division answer. Is the answer correct?

$$8\overline{)300} \quad 37 \text{ R } 6$$

27. *(23, 28)* (a) How many years is a century?

(b) How many years is half a century?

(c) Use the numbers in the answers to parts (a) and (b) to write a fraction equal to $\frac{1}{2}$.

28. *(Inv. 2, 28)* One fourth of an hour is how many minutes?

29. *(1, 12)* Write the next four terms in this counting sequence:

27, 18, 9, …