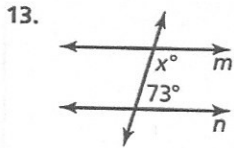


### 3.3 Proofs with Parallel Lines (pp. 133-140)

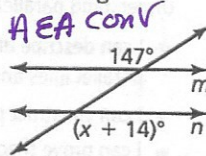


**Learning Target:** Prove and use theorems about identifying parallel lines.

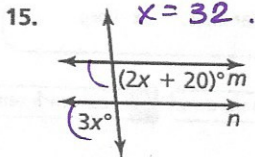
Find the value of  $x$  that makes  $m \parallel n$ . Explain your reasoning.



SST's Conv.  
 $x = 107$

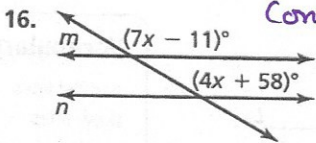


AEA Conv  
 $x = 133$

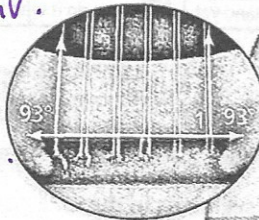


$x = 32$

OR VA  
SSI Conv.



Conv. CA  
 $x = 23$



An oud is a traditional Arab instrument. It is often called "the king of the instruments" because of its importance in Arab music.

17. The strings of a musical instrument called an oud are shown. Are the outer strings of the oud parallel? Explain.

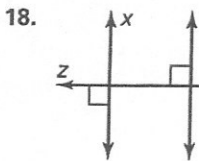
no  
 $m \angle 1 = 87^\circ$   
not  $93^\circ$

### 3.4 Proofs with Perpendicular Lines (pp. 141-148)

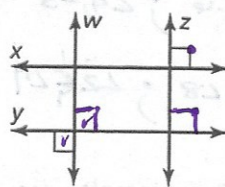


**Learning Target:** Prove and use theorems about perpendicular lines.

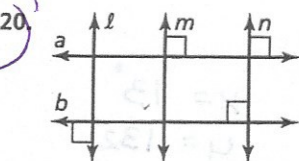
Determine which lines, if any, must be parallel. Explain your reasoning.



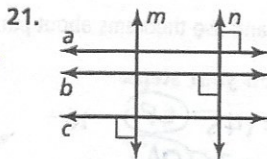
Lines  $\perp$  trans thm  
 $\therefore x \parallel y$



none  
 $z \perp x$   
 $w \perp y$  no connection.



$m \perp a$   
 $n \perp a$   
 $\therefore m \parallel n$

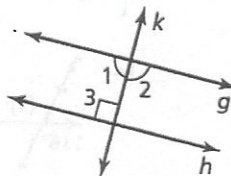


$a \parallel b$  b/c  $a \perp n$  &  $b \perp n$ .

22. Use the diagram to write a proof.

Given  $\angle 1 \cong \angle 2, h \perp k$

Prove  $g \parallel h$



- S
- $\angle 1 \cong \angle 2$
  - $k \perp g$
  - $h \perp k$
  - $g \parallel h$

- R.
- Given.
  - Linear Pair  $\perp$  Thm.
  - Given.
  - Line  $\perp$  to a trans thm.



3.5

Equations of Parallel and Perpendicular Lines (pp. 149-156)



**Learning Target:** Partition a directed line segment and understand slopes of parallel and perpendicular lines.

Find the coordinates of point  $P$  along the directed line segment  $AB$  so that  $AP$  to  $PB$  is the given ratio.

lotu

23.  $A(-3, 2), B(5, 5); 1$  to  $3$

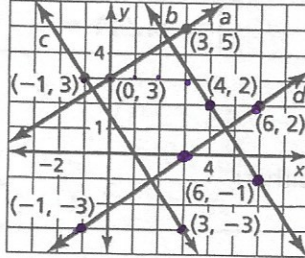
$(-1, 2.75)$

24.  $A(-2, 4), B(4, -3); 3$  to  $2$

$(1.6, -0.2)$

25. Determine which of the lines are parallel and which of the lines are perpendicular.

b||c  
a⊥b  
a||c



$m_a = \frac{2}{3}$   
 $m_b = -\frac{3}{2}$   
 $m_c = -\frac{6}{4} = -\frac{3}{2}$   
 $m_d = \frac{5}{7}$

Vocabulary

directed line segment

Write an equation of the line passing through point  $A$  that is parallel to the given line.  $y = -x$

26.  $A(3, -4), y = -x + 8$

$m = -1$

Write an equation of the line passing through point  $A$  that is perpendicular to the given line.

28.  $A(6, -1), y = -2x + 8$

$m = \frac{1}{2}$   
 $y = \frac{1}{2}x - 4$

29.  $A(-1, 5), y = \frac{1}{7}x + 4$

$m = -7$   
 $y = -7x - 2$

Find the distance from point  $A$  to the given line.

30.  $A(2, -1), y = -x + 4$

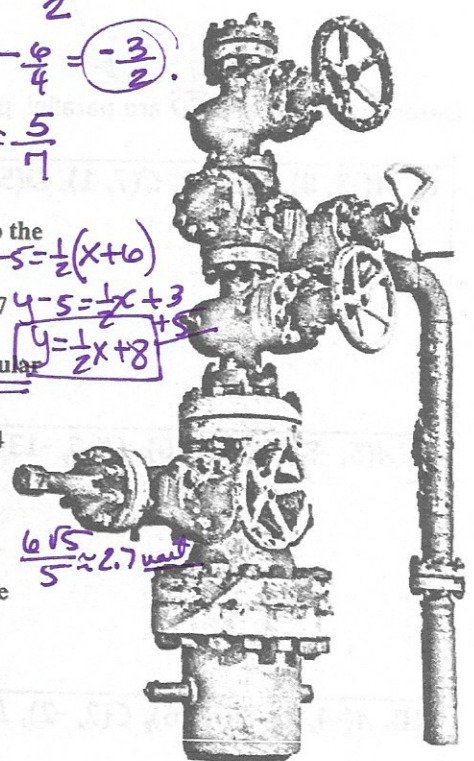
$\frac{3\sqrt{2}}{2} \approx 2.1$  units

31.  $A(-2, 3), y = \frac{1}{2}x + 1$

$\frac{6\sqrt{5}}{5} \approx 2.7$  units

32. A coordinate plane is superimposed on a property map. Each unit in the coordinate plane represents 1 foot. The location of a wellhead on the property is given by the point  $(12, 6)$ . How close is the wellhead to a property line modeled by the line  $y = \frac{1}{4}x - 14$ ?

$4\sqrt{17}$   
 $\approx 16.5$  ft.



Mathematical Thinking and Reasoning

3 MTR

COMPLETE TASKS WITH MATHEMATICAL FLUENCY

Mathematicians who complete tasks with mathematical fluency select efficient and appropriate methods for solving problems within the given context.

- Look back at 3.5 Explore It! part (b) on page 149. Did you use technology, or did you perform the steps by hand? Complete part (b) using the other method. Describe both processes. Then describe the advantages and disadvantages of each.
- Explore the inverse of the Corresponding Angles Theorem: "If two lines that are not parallel are cut by a transversal, then the pairs of corresponding angles are not congruent." Tell what tools you use, and describe your results.

inverse applies true.

GO DIGITAL




# 3 Chapter Review WITH CalcChat® *Key*

- Chapter Learning Target:** Understand parallel and perpendicular lines.
- Chapter Success Criteria:**
- ◆ I can describe angle relationships formed by parallel lines and a transversal.
  - ◆ I can construct parallel and perpendicular lines.
  - I can prove theorems involving parallel and perpendicular lines.
  - I can write equations of parallel and perpendicular lines.
- ◆ Surface  
■ Deep

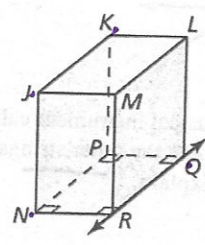
**SELF-ASSESSMENT**

1 I don't understand yet.    2 I can do it with help.    3 I can do it on my own.    4 I can teach someone else.


**3.1 Pairs of Lines and Angles** (pp. 121–126) 

**Learning Target:** Understand lines, planes, and pairs of angles.

Consider the lines that contain the segments in the figure and the planes that contain the faces of the figure. All angles are right angles. Which line(s) or plane(s) contain point  $N$  and appear to fit the description?

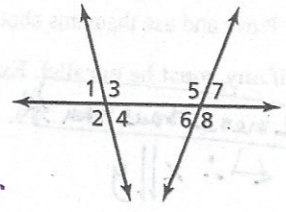


1. line(s) perpendicular to  $\overrightarrow{QR}$   $\overrightarrow{NR}$
2. line(s) parallel to  $\overrightarrow{QR}$   $\overrightarrow{NP}$
3. line(s) skew to  $\overrightarrow{QR}$   $\overrightarrow{JN}$
4. plane(s) parallel to plane  $LMQ$   $JKN$

- Vocabulary** 
- parallel lines
  - skew lines
  - parallel planes
  - transversal
  - corresponding angles
  - alternate interior angles
  - alternate exterior angles
  - consecutive interior angles

Identify all pairs of angles of the given type.

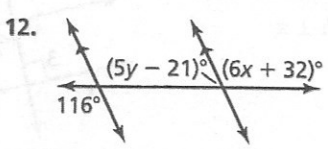
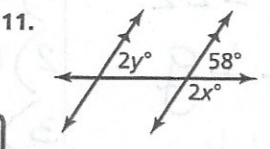
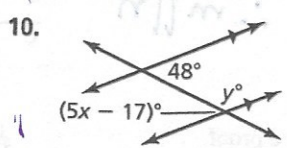
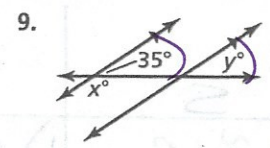
5. consecutive interior  $\angle 3$  &  $\angle 5$  ;  $\angle 4$ ,  $\angle 6$ .
6. alternate interior  $\angle 3$  &  $\angle 6$  ;  $\angle 4$ ,  $\angle 5$
7. corresponding
8. alternate exterior  $\angle 1$  &  $\angle 8$  ;  $\angle 2$  &  $\angle 7$ .



**3.2 Parallel Lines and Transversals** (pp. 127–132) 

**Learning Target:** Prove and use theorems about parallel lines.

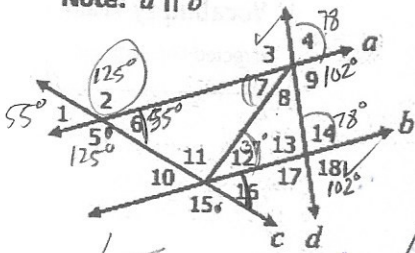
Find the values of  $x$  and  $y$ . Show your steps.



Extra questions (not in book):

9. If  $m\angle 2 = 125^\circ$ ,  $m\angle 12 = 37^\circ$  and  $m\angle 18 = 102^\circ$ , find the measure of each missing angle.

Note:  $a \parallel b$



a. $m\angle 1 = 55^\circ$ LP <sub>(2)</sub>	f. $m\angle 7 = 37^\circ$ AIA <sub>(12)</sub>	k. $m\angle 13 = 102^\circ$ VA <sub>(18)</sub>
b. $m\angle 3 = 102^\circ$ AEA <sub>(18)</sub>	g. $m\angle 8 = 41^\circ$	l. $m\angle 14 = 78^\circ$ LP <sub>(18)</sub>
c. $m\angle 4 = 78^\circ$ LP <sub>(CA<sub>14</sub>)</sub>	h. $m\angle 9 = 102^\circ$ CA <sub>(18)</sub>	m. $m\angle 15 = 125^\circ$ CA <sub>(5)</sub>
d. $m\angle 5 = 125^\circ$ VA <sub>(2)</sub>	i. $m\angle 10 = 55^\circ$ AIA <sub>(6)</sub> CA <sub>(1)</sub>	n. $m\angle 16 = 55^\circ$ CA <sub>(10)</sub>
e. $m\angle 6 = 55^\circ$ VA <sub>(1)</sub>	j. $m\angle 11 = 88^\circ$	o. $m\angle 17 = 78^\circ$ VA <sub>(14)</sub>

$$m\angle 11 = 180 - (m\angle 10 + m\angle 12) = 180 - (55 + 37) = 88^\circ$$

$$m\angle 8 = 180 - (m\angle 7 + m\angle 9) = 180 - (37 + 102) = 41^\circ$$

Determine if  $\overline{AB}$  and  $\overline{CD}$  are parallel, perpendicular or neither:

8.  $A(-3, 8), B(3, 2), C(7, 1), D(5, -1)$

Slope of $\overline{AB}$	Slope of $\overline{CD}$	Types of Lines
-1	1	$\perp$

9.  $A(5, -8), B(-2, -10), C(-6, -13), D(-2, 1)$

Slope of $\overline{AB}$	Slope of $\overline{CD}$	Types of Lines
$\frac{2}{7}$	$\frac{7}{2}$	neither.

10.  $A(-4, 7), B(-2, 6), C(2, -2), D(-8, 3)$

Slope of $\overline{AB}$	Slope of $\overline{CD}$	Types of Lines
$-\frac{1}{2}$	$-\frac{1}{2}$	$\parallel$

Write the slope-intercept form of the equation of the line through the given points.

15) through:  $(-1, -5)$  and  $(-4, 1)$   $m = \frac{1+5}{-4+1} = \frac{6}{-3}$

16) through:  $(0, 3)$  and  $(5, -4)$

$$y - 1 = -2(x + 4)$$

$$y - 1 = -2x - 8$$

$$y = -2x - 7$$

$$m = \frac{-4-3}{5-0} = \frac{-7}{5}$$

$$y = -\frac{7}{5}x + 3$$

$$y = -2x - 7$$