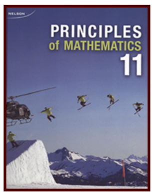
Strengthening and Conditioning

Lesson 4.1: Parallel Lines



Refer to *Principles of Mathematics 11* pages 72 and 78 for more examples.

- Page 72, #2, 3, 5, and 6
- Page 78, #1, 4, 8, 10, 16, 19a, and 20

Question 2, p. 72

a. $\angle EGB = \angle AGH = \angle GHD = \angle CHF$ and $\angle EGA = \angle BGH = \angle GHC = \angle DHF$

b. Pairs of angles in the diagram that are not equal are supplementary (they sum to 180°).

Question 3, p. 72

Descriptions will vary. A sample is given.
Draw a line and a transversal and measure the angle between the two. Use the protractor to draw a second line that crosses the transversal at the same angle so the corresponding angles are equal.

Question 5, p. 72

a. The corresponding angles are not equal so the lines are not parallel.

b. The alternate exterior angles are equal so the lines are parallel.

c. $\angle AGH = 180^\circ - 86^\circ = 94^\circ$. The corresponding angles are equal so the lines are parallel.

d. $\angle CHF = 180^\circ - 41^\circ = 139^\circ$ $\angle CHG = 180^\circ - 41^\circ = 139^\circ$. The corresponding angles are not equal so the lines are not parallel.

Question 6, p. 72

The lines are parallel even though it doesn't look like it. Try placing two straightedges along two different lines to see that they are parallel.

Question 1, p. 78

$\angle WYD = 90^\circ$ because $\angle AWY = 90^\circ$ and $\angle KWA = 90^\circ$ (since the two angles form a straight line) and corresponding angles are equal.

$\angle YDA = 115^\circ$ because $\angle YDA$ and $\angle WAL$ are corresponding angles.

$\angle DEB = 80^\circ$ because $\angle DEB$ and $\angle CBE$ are alternate interior angles.

$\angle EFS = 45^\circ$ because $\angle EFS$ and $\angle NCX$ are alternate exterior angles.

Question 4, p. 79

a. $w = 120^\circ$ because w is opposite a 120° angle.

$$y + w = 180^\circ$$
$$y + 120^\circ = 180^\circ$$
$$y = 60^\circ$$

$x = 60^\circ$ because x and y are corresponding angles.

b. $d = 55^\circ$ because d is opposite a 55° angle.
$b = 55^\circ$ because b and d are corresponding angles.
$f = 55^\circ$ because b and f are opposite angles.

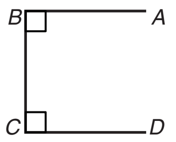
$c + 112^\circ = 180^\circ$
$c = 68^\circ$

$a = 112^\circ$ because a and 112° are corresponding angles.
$e = 112^\circ$ because a and e are opposite angles.

c. $d = 48^\circ$ because d and 48° are corresponding angles.
$c = 48^\circ$ because c and d are alternate interior angles.
$g = 132^\circ$ because g and c must sum to 180°.
$e = 132^\circ$ because e and g are corresponding angles.
$f = 132^\circ$ because f and e are opposite angles.
$a = 48^\circ$ because a and 48° are corresponding angles.
$b = 48^\circ$ because a and b are corresponding angles.

Question 8, p. 79

a. Joshua has used the transitive property, but this property does not hold for perpendicular lines; if two lines are perpendicular to a third line, they are not perpendicular to each other. Consider drawing a diagram to represent the given information.



b. If $AB \perp BC$ and $BC \perp CD$ then $AB \parallel CD$.

Question 10, p. 80

The interior angles on the same side of a transversal are supplementary, not equal. The statement $QP \parallel RS$ is still true because both angles are equal to 90°.

Question 16, p. 81

$\angle ACD = \angle ACF + \angle FCD$

$\angle ACF = \angle BAC$ because they are alternate interior angles.

$\angle DCF = \angle CDE$, $\angle FCD = \angle CDE$ because they are alternate interior angles.

Substituting these into the original equation gives $\angle ACD = \angle BAC + \angle CDE$.

Question 19a, p. 82

a. Disagree. Showing any one of the three statements to be true is enough to show that the lines are parallel.

Question 20, p. 82

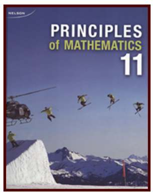
a. Alternate exterior angles are equal, so

$$\begin{aligned}(3x+10)^\circ &= (6x-14)^\circ \\ 24^\circ &= 3x \\ 8^\circ &= x\end{aligned}$$

b. Angles on the same side of a transversal, inside parallel lines, are supplementary (sum to 180°), so

$$\begin{aligned}(9x+32)^\circ+(11x+8)^\circ &= 180^\circ\\ 20x+40^\circ &= 180^\circ\\ 20x &= 140^\circ\\ x &= 7^\circ\end{aligned}$$

Lesson 4.2: Angle Properties in Triangles and Other Polygons



Refer to *Principles of Mathematics 11* pages 90 and 99 for more examples.

- Page 90, #1, 2, 3b, 4, 6, 10, 12a, and 14
- Page 99, # 3, 6, 9, 13, and 15

Question 1, p. 90

This is not a proof. A proof will show that the triangle interior angles sum is 180° for all triangles.

Question 2, p. 90

Disagree. If a triangle contained two right angles, the third angle would need to be 0°. This means you would either have an open figure or two overlapping lines, neither of which is a triangle.

Question 3b, p. 90

b. $\angle ACB$ and $\angle ECB$ lie on a straight line, so they must sum to 180°.

$\angle ACB + \angle ECB = 180^\circ$

$\angle ACB + 134^\circ = 180^\circ$

$\angle ACB = 46^\circ$

$\angle ACB$ and $\angle DCE$ are opposite angles, so they are equal.

$\angle DCE = \angle ACB$

$\angle DCE = 46^\circ$

$\angle ACB$, $\angle A$, and $\angle B$ form a triangle, so they must sum to 180°.

$\angle ACB + \angle A + \angle B = 180^\circ$

$46^\circ + \angle A + 49^\circ = 180^\circ$

$\angle A = 85^\circ$