Chapter 2: Properties of Angles and Triangles

Lesson 2.1: Exploring Parallel Lines, page 72

1. a) e.g.,

Parallel Lines	Transversals
bottom rail lines	diagonal struts
rail ties	rail ties
supports	
top rail lines	
struts in top rail	

b) No. The photograph is a perspective image so the corresponding angles when measured or traced would not be equal and parallel lines on the bridge when traced will not be parallel.

2. The following are pairs of corresponding angles:

$\angle EGB = \angle GHD$, $\angle AGE = \angle CHG$,

$\angle AGH = \angle CHF$, $\angle BGH = \angle DHF$,

$\angle EGA = \angle HGB$, $\angle EGB = \angle HGA$,

$\angle GHD = \angle FHC$, $\angle GHC = \angle FHD$,

$\angle EGA = \angle FHD$, $\angle EGB = \angle FHC$,

$\angle GHD = \angle HGA$, $\angle GHC = \angle BGH$.

Yes. Pairs of angles that are not equal are supplementary angles.

3. Using a ruler, draw a horizontal line and then a transversal. Measure an angle made by the horizontal line and transversal. Create an angle with this measure using a protractor anywhere else but on the same side of the transversal. Use the particular angle to draw a parallel line.

4. The transversal is the top edge of the plank of wood. The bevel has a protractor on it. As long as the angle of the T-bevel is the same, then the lines will be parallel because corresponding angles will be equal. The plank must have a true straight edge for the T-bevel to rest on and angles to be drawn accurately.

5. a) No. The measures of corresponding angles $\angle BGE$ and $\angle DHG$ are not equal, so AB is not parallel to CD.

b) Yes. $\angle BGE$ and $\angle AGE$ are supplementary so $\angle AGE$ is 67°. $\angle CHF$ and $\angle CHG$ are supplementary so $\angle CHG$ is 67°. Corresponding angles $\angle AGE$ and $\angle CHE$ are equal, so AB is parallel to CD.

c) Yes. $\angle BGH$ and $\angle AGH$ are supplementary so $\angle AGH$ is 94°. Corresponding angles $\angle AGH$ and $\angle CHE$ are equal, so AB is parallel to CD.

d) No. $\angle CHG$ and $\angle DHG$ are supplementary, so $\angle CHE$ is 139°. Corresponding angles $\angle CHG$ and $\angle AGE$ are not equal, so AB is not parallel to CD.

6. Disagree. The perpendicular distances along pairs of lines are constant or equal. Therefore, the diagonal lines are parallel. The hatching across each diagonal creates an optical illusion that the diagonals are skewed.

Lesson 2.2: Angles Formed by Parallel Lines, page 78

1.

Statement	Justification
KP, LQ, MR, and NS are transversals for the parallel lines.	Given WX and YZ are parallel.
$\angle AWY = 90°$	Given
$\angle WYD + \angle AWY = 180°$ $\angle WYD = 90°$	Interior angles on the same side of a transversal are supplementary.
$\angle WAL = 115°$	Given
$\angle YDA = \angle WAL$ $\angle YDA = 115°$	Corresponding angles are equal.
$\angle CBE = 80°$	Given
$\angle DEB = \angle CBE$ $\angle DEB = 80°$	Alternate interior angles are equal.
$\angle XCN = 45°$	Given
$\angle EFS = \angle XCN$ $\angle EFS = 45°$	Alternate exterior angles are equal.

2. a) Yes. The lines are parallel because the two given corresponding angles are equal.
b) No. The lines are not parallel because the two given interior angles on the same side of the transversal are not supplementary.
c) Yes. The lines are parallel because the two given alternate exterior angles are equal.
d) Yes. The lines are parallel because the two given alternate exterior angles are equal.

3.

	Statement	Justification
a)	$k = p$	Alternate interior angles are equal.
b)	$a = j$	Corresponding angles are equal.
c)	$j = q$	Alternate exterior angles are equal.
d)	$g = d$	Vertically opposite angles are equal.
e)	$b = d$ $d = m$ $b = m$	Corresponding angles are equal. Corresponding angles equal. Apply the transitive property by substituting m for d.
f)	$e = g$ $g = p$ $e = p$	Corresponding angles are equal. Corresponding angles are equal. Apply the transitive property by substituting p for g.

	Statement	Justification
g)	$n = m$ $m = d$ $d = n$	Alternate exterior angles are equal. Corresponding angles are equal. Apply the transitive property by substituting n for d.
h)	$f + k = 180°$	Interior angles on the same side of a transversal are supplementary.