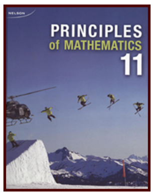
b. Angles on the same side of a transversal, inside parallel lines, are supplementary (sum to 180°), so

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

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°.

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

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

$\angle A=85^\circ$

Question 4, p. 90

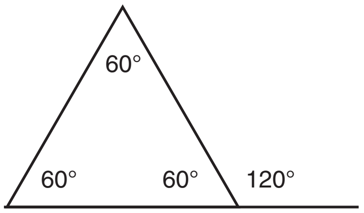
ΔQRS is isosceles so $\angle R$ and $\angle S$ are equal.

$$\angle Q + \angle R + \angle S = 180^\circ$$
$$\angle Q + \angle R + \angle R = 180^\circ$$
$$2\angle R = 180^\circ - \angle Q$$
$$\angle R = \frac{180^\circ - \angle Q}{2}$$

$$\angle S = \angle R$$
$$\angle S = \frac{180^\circ - \angle Q}{2}$$

Question 6, p. 91

The interior angles in an equilateral triangle are equal and must sum to 180°, so each must be 60°. An external angle and its adjacent internal angle must sum to 180°, so each external angle must be 120°.



Question 10, p. 92

Proofs may vary, a sample is shown.

Statement	**Justification**
$MA \parallel HT$	Alternate interior angles are equal.
$\angle HMT = 65^\circ$	Triangle interior angles sum.
$MH \parallel AT$	Alternate interior angles are equal.
MATH is a parallelogram	*MATH* is a quadrilateral with two pairs of parallel sides.

Question 12a, p. 92

Disagree. $\angle FGH$ and $\angle IHJ$ are not corresponding, alternate interior, or alternate exterior angles, so even if FG was parallel to HI, it would not be expected that $\angle FGH$ and $\angle IHJ$ would have the same measure.

Question 14, p. 92

$$\begin{aligned}\angle AFN + \angle NFU &= 180^\circ\\ 115^\circ + \angle NFU &= 180^\circ\\ \angle NFU &= 65^\circ\end{aligned}$$

$$\begin{aligned}\angle BNU + \angle FNU &= 180^\circ\\ 149^\circ + \angle FNU &= 180^\circ\\ \angle FNU &= 31^\circ\end{aligned}$$

$$\begin{aligned}\angle U + \angle NFU + \angle FNU &= 180^\circ\\ \angle U + 65^\circ + 31^\circ &= 180^\circ\\ \angle U &= 84^\circ\end{aligned}$$

Question 3, p. 99

$$\begin{aligned}\text{interior angles sum} &= (n-2)180^\circ\\ 3060^\circ &= (n-2)180^\circ\\ 17 &= n-2\\ 19 &= n\end{aligned}$$

Question 6, p. 100

The loonie is a regular hendecagon (11-sided polygon).

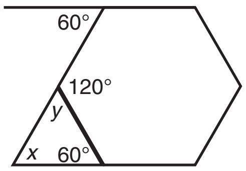
$$\begin{aligned}\text{interior angle} &= \frac{(n-2)180^\circ}{n}\\ &= \frac{(11-2)180^\circ}{11}\\ &\doteq 147.3^\circ\end{aligned}$$

Question 9, p. 100

a. Agree. The interior angles of a regular polygon are equal. As such, so are the exterior angles.

The interior angles of a regular hexagon each measure 120° and the exterior angles each measure 60°.

Extend the sides of the hexagon and label known interior and exterior angles. Angle y has a measure of 60° (straight angle) and angle x has a measure of 60° (interior angles in a triangle sum to 180°). Since alternate interior angles are equal, the top and bottom of the hexagon are parallel. This reasoning can be used to conclude all other pairs of opposite sides are parallel.



b. The opposite sides of a regular polygon with an even number of sides are parallel.

Question 13, p. 101

a. The cuts will bisect the interior angles.

$$\begin{aligned}\text{interior angle} &= \frac{(n-2)180^\circ}{n}\\ &= \frac{(6-2)180^\circ}{6}\\ &= 120^\circ\end{aligned}$$

Half the interior angle of a hexagon is 60°, so Martin will need to set his saw to 60°.

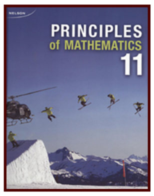
b. $$\begin{aligned}\text{interior angle} &= \frac{(n-2)180^\circ}{n}\\ &= \frac{(8-2)180^\circ}{8}\\ &= 135^\circ\end{aligned}$$

Half the interior angle of an octagon is 67.5°, so to make an octagonal table the saw will need to be set to 67.5°.

Question 15, p. 102

The angles indicated are external angles for the pentagon in the middle of the figure. The sum of exterior angles of a polygon is 360°.

Lesson 4.3: Congruent Triangles



Refer to *Principles of Mathematics 11* pages 106 and 113 for more examples.

- Page 106, #1b, 2, 3b, and 3c
- Page 113, #2b, 6, 7, 9, 11, and 14

Question 1b, p. 106

b. The two are congruent by the AAS congruence.

Question 2, p. 106

a. Yes, the two are congruent by the AAS congruence.
b. No, AAA is not a congruence relationship.

Question 3b and c, p. 106

b. $FH = JK$, $\angle H = \angle K$, and $GH = LK$ so $\Delta GHF \cong \Delta LKJ$ by SAS.

c. $AC = BU$, $CR = BS$, and $AR = US$ so $\Delta ACR \cong \Delta UBS$ by SSS.

Question 2b, p. 113

b. $\angle PYO = \angle NYO$, $YO = YO$, and $\angle POY = \angle NOY$ so $\Delta POY = \Delta NOY$ by ASA.

Question 6, p. 113

Proofs may vary, a sample is shown.

Statement	Justification
$\angle XWY = \angle ZWY$	Definition of a bisector.
$\angle XYW = \angle ZYW$	Definition of a bisector.
$WY = WY$	Same line segment.
$\Delta WXY = \Delta WZY$	ASA
$XY = ZY$	They are corresponding sides of congruent triangles.