7. e.g.,

a) $$\frac{180°(n-2)}{n} = 140°$$
$$180°(n-2) = 140°n$$
$$180°n - 360° = 140°n$$
$$40°n = 360°$$
$$n = 9$$

b) There are 9 exterior angles that measure $180° - 140° = 40°$; $9(40°) = 360°$.

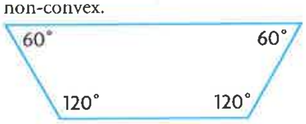
8. a) 45° c) 1080°
b) 135° d) 1080°

9. a) Agree
b) e.g., Opposite sides are parallel in a regular polygon that has an even number of sides.

10. a) 36° b) isosceles triangle

11. The numerator of the formula for $S(10)$ should be $180°(10 - 2)$; $S(10) = 144°$.

12. a) e.g., A single line drawn anywhere through the polygon. For convex polygons, it intersects two sides only. For non-convex polygons, it can intersect in more than two sides.
b) If any diagonal is exterior to the polygon, the polygon is non-convex.

13. a) 

b) 

14. 110°, 120°, 90°, 110°, 110°

15. 360°

16. a) $\angle a = 60°$, $\angle b = 60°$, $\angle d = 60°$, $\angle c = 120°$
b) $\angle a = 140°$, $\angle b = 20°$, $\angle c = 60°$, $\angle d = 60°$

17. 720°

18. e.g.,

$\triangle EOD \cong \triangle DOC$	$EO = DO$ and $DO = CO$ are given, and $ED = DC$ because the polygon is regular.
$\angle ODE = \angle ODC$ and $\angle ODE = \angle OED$	$\triangle EOD$ and $\triangle DOC$ are congruent and isosceles.
$\angle ODE + \angle ODC = 108°$	The interior angles of a regular pentagon are 108°.
$2\angle ODE = 108°$ $\angle ODE = 54°$ $\angle OED = 54°$	$\angle ODE = \angle ODC$ and $\angle ODE = \angle OED$
$\angle EAD = \angle EDA$	$\triangle ADE$ is isosceles because the polygon is regular.
$180° = \angle DEA + \angle EAD + \angle ADE$ $180° = 108° + 2\angle ADE$ $180° - 108° = 2\angle ADE$ $36° = \angle ADE$	
$180° = \angle FED + \angle EDF + \angle EFD$ $180° = 54° + 36° + \angle EFD$ $180° - 54° - 36° = \angle EFD$ $90° = \angle EFD$	$\angle EDF = \angle ADE$ and $\angle FED = \angle OED$

19. e.g., If a polygon is divided into triangles by joining one vertex to each of the other vertices, there are always two fewer triangles than the original number of sides. Every triangle has an angle sum of 180°.

20. Yes, e.g., A tiling pattern can be created by putting four 90° angles together or three 120° angles together.

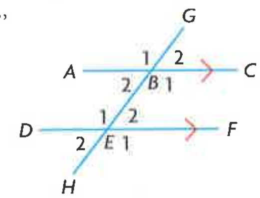
21. regular dodecagon

Chapter Self-Test, page 104

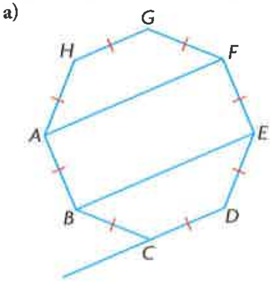
1. a) $a = 70°$, $b = 75°$, $c = 75°$
b) $a = 20°$, $b = 80°$, $c = 100°$

2. a) $x = 19°$ b) $x = 26°$

3. a) and c) e.g.,



4. regular hexagons: six 120° angles; small triangles: three 60° angles; large triangles: one 120° angle and two 30° angles.

5. a) 

b) 45°

c)

Extend BC to form exterior angles $\angle ABI$ and $\angle DCJ$.	
$\angle ABI = 45°$ $\angle DCJ = 45°$	Exterior angle of regular octagon
$BE \parallel CD$	Alternate exterior angles are equal.
$\angle CBE = 45°$	Alternate interior angles
$\angle ABE = 90°$	Supplementary angles
Similarly, by extending AH and following the process above, $\angle FAB = 90°$.	
$\angle ABE + \angle FAB = 180°$	
$AF \parallel BE$	Interior angles on the same side of the transversal are supplementary.

6. 720°

Chapter Review, page 106

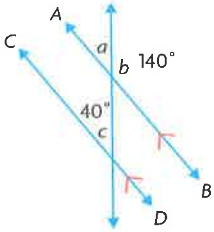
1. e.g., The side bars coming up to the handle are parallel and the handle is a transversal.

2. a) $\angle a$, $\angle e$; $\angle b$, $\angle g$; $\angle c$, $\angle f$; $\angle d$, $\angle h$
b) No. e.g., The lines are not parallel, so corresponding pairs cannot be equal.
c) 8; e.g., $\angle a$, $\angle b$
d) Yes; $\angle a$, $\angle d$; $\angle b$, $\angle c$; $\angle e$, $\angle h$; $\angle f$, $\angle g$

3. $\angle a = 35°$, $\angle b = 145°$

Answers

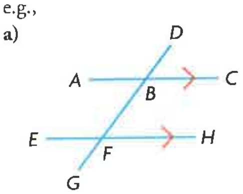
4.



$\angle a + \angle b = 180°$	$\angle a$ and $\angle b$ form a straight angle.
$\angle a = 40°$	Substitution and subtraction
$\angle c = 40°$	Given
$\angle a = \angle c$	Corresponding angles are equal.
$AB \parallel CD$	

5. **a)** $a = 104°$, $b = 76°$, $c = 76°$
b) $a = 36°$, $b = 108°$, $c = 108°$

6. e.g.,
a)



b) Measure $\angle ABF$ and $\angle BFH$. Measure $\angle DBA$ and $\angle BFE$. Both pairs should be equal.

7. e.g.,

$\angle QRS = \angle RST$	Alternate interior angles
$\angle QRS = \angle TRS$	Given
$\angle RST = \angle TRS$	Transitive property
$TS = TR$	Isosceles triangle

8. **a)** $x = 40°$, $y = 95°$, $z = 45°$
b) $x = 68°$, $y = 112°$, $z = 40°$

9. e.g.,

$\angle OPL = \angle POL$ $\angle OQN = \angle NOQ$	$\triangle OPL$ and $\triangle NOQ$ are isosceles.
$\angle PLO = 180° - (\angle POL + \angle OPL)$ $\angle QNO = 180° - (\angle NOQ + \angle OQN)$	The sum of the angles in each triangle is 180°.
$\angle PLO = 180° - 2\angle POL$ $\angle QNO = 180° - 2\angle NOQ$	Substitute $\angle OPL = \angle POL$ and $\angle OQN = \angle NOQ$.
$\angle PLO + \angle QNO = 180° - 90°$ $\angle PLO + \angle QNO = 90°$	$\angle PLO$ and $\angle QNO$ are the two acute angles in the right triangle LMN.
$(180° - 2\angle POL) + (180° - 2\angle NOQ) = 90°$	Substitute the expressions for $\angle PLO$ and $\angle QNO$.
$\angle POL + \angle NOQ = 135°$	Isolate $\angle POL + \angle NOQ$ in the equation.
$\angle POQ = 45°$	$\angle POQ$, $\angle POL$, and $\angle NOQ$ are supplementary because they form a straight line.

10. **a)** 2340°
b) e.g., The sum of the 15 exterior angles is 360°, so each exterior angle is $360° \div 15 = 24°$.

11. e.g.,

$\angle ABC = 108°$, $\angle BCD = 108°$, $\angle CDE = 108°$	The angles in a regular pentagon are 108°.
$\angle BCA + \angle BAC = 180° - 108°$	The sum of the angles of $\triangle ABC$ is 180°.
$2\angle BCA = 72°$ $\angle BCA = 36$	$\triangle ABC$ is isosceles with $\angle BCA = \angle BAC$.
$\angle ACD = \angle BCD - \angle BCA$ $\angle ACD = 108° - 36°$ $\angle ACD = 72°$	$\angle BCA + \angle ACD = \angle BCD$
$AC \parallel ED$	$\angle ACD = 72°$ and $\angle CDE = 108°$ are supplementary interior angles on the same side of the transversal CD.

Cumulative Review, Chapters 1–2, page 110

1. e.g.,
a) A conjecture is a testable expression that is based on available evidence but is not yet proven.
b) Inductive reasoning involves looking at examples, and by finding patterns and observing properties, a conjecture may be made.
c) The first few examples may have the same property, but that does not mean that all other cases will have the same property. e.g., Conjecture: The difference of consecutive perfect cubes is always a prime number.
$2^3 - 1^3 = 7$ $\quad$ $5^3 - 4^3 = 61$
$3^3 - 2^3 = 19$ $\quad$ $6^3 - 5^3 = 91$,
$4^3 - 3^3 = 37$ $\quad$ 91 is not a prime number.

2. Yes, her conjecture is reasonable.

3. One. e.g., Conjecture: All prime numbers are odd numbers. 2 is a prime number but is not odd.

4. Disagree.

5. **a)** Conjecture: The sum of two odd numbers is always an even number.
b) e.g., Let $2n + 1$ and $2k + 1$ represent any two odd numbers.
$(2n + 1) + (2k + 1) = 2n + 2k + 2 = 2(n + k + 1)$
$2(n + k + 1)$ is an even number.

6. e.g.,

Instruction	Result
Choose a number.	x
Double it.	$2x$
Add 9.	$2x + 9$
Add the number you started with.	$2x + 9 + x = 3x + 9$
Divide by 3.	$\frac{(3x + 9)}{3} = x + 3$
Add 5.	$x + 3 + 5 = x + 8$
Subtract the number you started with.	$(x + 8) - x = 8$

7. **a)** The number of circles in the nth figure is $1 + 5(n - 1) = 5n - 4$; there are 71 circles in the 15th figure.
b) Inductive. A pattern in the first few cases was used to come up with a formula for the general case.

8. Let $ab0$ represent the three digit number. Then, $ab0 = 100a + 10b = 10(10a + b)$, which is divisible by 10.