b)

Statement	Justification
$\angle BED = 55°$ $AC \parallel ED$	Given Proven
$\angle BFG = \angle BED$ $\angle BFG = 55°$	Property of similar triangles
$FG \parallel ED$	For *FG* and *ED*, corresponding angles are equal.

c)

Statement	Justification
$\angle ABF = 55°$ $\angle BFG = 55°$	Given Proven
$\angle BFG = \angle BED$	Property of equality
$AC \parallel FG$	Alternate interior angles are equal.

7. e.g., In each row of parking spots, the lines separating each spot are parallel. The line down the centre is the transversal to the two sets of parallel lines.
8. e.g., Yes, the sides are parallel. The interior angles are supplementary and so the lines are always the same distance apart.

Lesson 2.3: Angle Properties in Triangles, page 90

1. No. It only proves the sum is 180° in that one triangle.
2. Disagree. The sum of the three interior angles in a triangle is 180°.
3. a)

Statement	Justification
$\angle WXY = 101°$	Given
$\angle YXZ + \angle WXY = 180°$ $\angle YXZ = 79°$	Supplementary angles
$\angle XYZ = 64°$ $\angle YXZ = 79°$	Given Proven
$\angle Z + \angle YXZ + \angle WXY = 180°$ $\angle Z = 37°$	Sum of interior angles in triangle

b)

Statement	Justification
$\angle BCE = 134°$	Given
$\angle ACB + \angle BCE = 180°$ $\angle ACB = 46°$	Supplementary angles
$\angle DCE = \angle ACB$ $\angle DCE = 46°$	Vertically opposite angles
$\angle B = 49°$	Given
$\angle A + \angle B + \angle ACB = 180°$ $\angle A = 85°$	Sum of interior angles in triangle

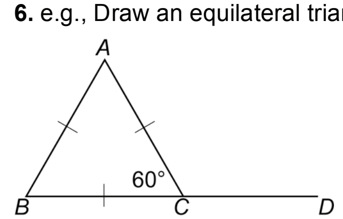
4. The lengths of *QR* and *QS* are equal, so $\triangle QRS$ is isosceles. So, the measures of $\angle R$ and $\angle S$ are equal by definition.

Statement	Justification
Let the measure of $\angle Q$ be *n*, in degrees. $\angle R = \angle S$	Property of isosceles triangle
$\angle Q + \angle R + \angle S = 180°$ $n° + \angle R + \angle R = 180°$ $2\angle R = (180 - n)°$ $\angle R = \frac{1}{2}(180 - n)°$	Sum of interior angles of triangle Substitute the known quantities.

5.

Statement	Justification
BC, *BC*, *CD*, and *AD* are equal in length.	Given
In $\triangle BCD$, since the three sides are equal, $\triangle BCD$ is equilateral. Therefore, $\angle CBD = 60°$ $\angle C = 60°$ $\angle BDC = 60°$	Property of equilateral triangle
$\angle BDA + \angle BDC = 180°$ $\angle BDA = 120°$	Supplementary angles
In $\triangle ABD$, since two sides are equal, $\triangle ABD$ is isosceles. Therefore, $\angle DBA = \angle A$	Property of isosceles triangle
$\angle A + \angle DBA + \angle BDA = 180°$ $\angle A + \angle A + 120° = 180°$ $2\angle A = 60°$ $\angle A = 30°$	Sum of interior angles of a triangle Substitute known quantities.

6. e.g., Draw an equilateral triangle to help you.



Statement	Justification
For equilateral $\triangle ABC$, the measures of the three angles are equal. So, $\angle A = 60°$ $\angle B = 60°$ $\angle ACB = 60°$	Property of equilateral triangle
$\angle ACD$ is the exterior angle to $\angle A$ and $\angle B$.	Given
$\angle ACD + \angle ACB = 180°$ $\angle ACD = 120°$	Supplementary angles

7.

Statement	Justification
$\angle AND = 98°$ $\angle DYS = 29°$	Given Given
For $\triangle NSY$, $\angle ASY + \angle AND + \angle DYS = 180°$ $\angle ASY = 53°$	Sum of interior angles in triangle
$\angle SAD = 127°$	Given
$\angle ASY + \angle SAD = 180°$	Property of equality
$SY \parallel AD$	Interior angles on same side of transversal are supplementary.

8. a) The sum of *a*, *c*, and *e* is 360°.

b) Yes. Pairs of vertically opposite angles, so $b = a$, $d = c$, $f = e$. So, the sum of *b*, *d*, and *f* is also 360°.

c)

Statement	Justification
$x + a = 180°$ $a = 180° - x$	Supplementary angles
$y + c = 180°$ $c = 180° - y$	Supplementary angles
$z + e = 180°$ $e = 180° - z$	Supplementary angles
$x + y + z = 180°$	Sum of interior angles in triangle
Let $S = a + c + e$. $S = (180° - x) + (180° - y)$ $+ (180° - z)$ $S = 540° - (x + y + z)$ $S = 540° - 180°$ $S = 360°$	Substitute for the known quantities.

9. a) If *DUCK* is a parallelogram, the measures of opposite pairs of angles are equal. In Benji's solution, $\angle D$ should equal $\angle C$, but does not.

b)

Statement	Justification
$DK \parallel UC$ $\angle KUC = 35°$	Property of parallelogram Given
$\angle DKU = \angle KUC$ $\angle DKU = 35°$	Alternate interior angles
$\angle KDU = 100°$	Given
$180° = \angle DUK + \angle DKU + \angle KDU$ $\angle DUK = 180° - (35° + 100°)$ $\angle DUK = 45°$	Sum of interior angles of triangle Substitute for the known quantities
$DU \parallel KC$	Property of parallelogram
$\angle UKC = \angle DUK$ $\angle UKC = 45°$	Alternate interior angles
$\angle UCK = \angle KDU$ $\angle UCK = 100°$	Opposite angles in parallelogram

10. e.g.,

Statement	Justification
$\angle MTH = 45°$ $\angle AMT = 45°$	Given Given
$\angle MTH = \angle AMT$	Property of equality
$MA \parallel HT$	Alternate interior angles are equal.
$\angle HTA = 110°$ $\angle MHT = 70°$	Given Given
$\angle HTA + \angle MHT = 180°$	Property of equality
$MH \parallel AT$	Interior angles on same side of transversal are supplementary

11.

Statement	Justification
$a = 30°$	Vertically opposite angles are equal.
$b + 30° = 180°$ $b = 150°$	Supplementary angles
$d + 115° = 180°$ $d = 65°$	Supplementary angles
$c + d + 30° = 180°$ $c = 85°$	Sum of interior angles in triangle

12. e.g.,

a) Disagree. $\angle FGH$ and $\angle IHJ$ are not corresponding angles, alternate interior angles, or alternate exterior angles.

b)

Statement	Justification
$\angle GFH = 180° - (55° + 75°)$ $\angle GFH = 50°$	The sum of the angles of $\triangle FGH$ is 180°
$FG \parallel HI$	$\angle GFH$ and $\angle IHJ$ are equal corresponding angles.

13.

Statement	Justification
$\angle NOP = 110°$	Given
$\angle J = 110°$	Corresponding angles
$\angle LKO = 140°$	Given
$\angle JKO + \angle LKO = 180°$ $\angle JKO = 40°$	Supplementary angles
$\angle JOK + \angle J + \angle JKO = 180°$ $\angle JOK = 30°$	Sum of interior angles in triangle
$\angle LNO = 140°$	Opposite angles in parallelogram are equal.
$\angle NOK + \angle LNO = 180°$ $\angle NOK = 40°$	Interior angles on same side of transversal
$\angle KLN = 40°$	Opposite angles in parallelogram are equal.
$\angle LNM + \angle LNO = 180°$ $\angle LNM = 40°$	Supplementary angles
$\angle JON = \angle KON + \angle JOK$ $\angle JON = 70°$	Property of equality

$\angle M + \angle JON = 180°$ $\angle M = 110°$	Interior angles on same side of transversal
$\angle MLN + \angle LNM + \angle M = 180°$ $\angle MLN = 30°$	Sum of interior angles in triangle
$\angle KLM = \angle KLN + \angle MLN$ $\angle KLM = 70°$	Property of equality

14.

Statement	Justification
$\angle AFN = 115°$	Given
$\angle NFU + \angle AFN = 180°$ $\angle NFU = 65°$	Supplementary angles
$\angle BNU = 149°$	Given
$\angle UNF + \angle BNU = 180°$ $\angle UNF = 31°$	Supplementary angles
$\angle FUN + \angle NFU + \angle UNF = 180°$ $\angle FUN = 84°$	Sum of interior angles in triangle

15. a)

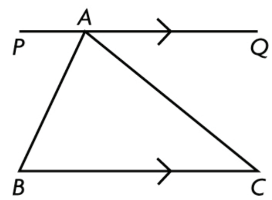
Statement	Justification
$\angle YXZ = 35°$	Given
$\angle AXZ + \angle YXZ = 180°$ $\angle AXZ = 145°$	Supplementary angles
$\angle XZY = 50°$	Given
$\angle EZY + \angle XZY = 180°$ $\angle EZY = 130°$	Supplementary angles
$\angle XYZ + \angle YXZ + \angle XZY = 180°$ $\angle XYZ = 95°$	Sum of interior angles in triangle
$\angle XYC + \angle XYZ = 180°$ $\angle XYC = 85°$	Supplementary angles

b) $\angle AXZ + \angle XYC + \angle EZY = 145° + 85° + 130°$
$\angle AXZ + \angle XYC + \angle EZY = 360°$

16.

Statement	Justification
MO and *NO* are angle bisectors.	Given
$\angle LNP$ is an exterior angle for $\triangle LMN$.	Given
$\angle L + 2a = 2b$ $\angle L = 2b - 2a$ $\angle L = 2(b - a)$	Exterior angle is equal to sum of the two non-adjacent angles.
$\angle ONP$ is an exterior angle for $\triangle MNO$.	Given
$\angle O + a = b$ $\angle O = b - a$	Exterior angle is equal to sum of the two non-adjacent angles.
$\angle L = 2(b - a)$ $\angle L = 2(\angle O)$	Substitute for the known quantity.

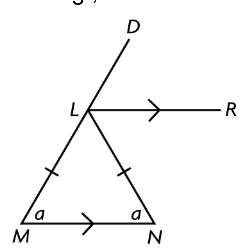
17. e.g., Drawing a parallel line through one of the vertices and parallel to one of the sides creates three angles whose sum is 180°. The two outside angles are equal to the alternate interior angles in the triangle. The middle angle is the third angle in the triangle. Therefore, the three angles in the triangle add up to 180°.
$\angle PAB = \angle ABC$ and $\angle QAC = \angle ACB$



18.

Statement	Justification
$\angle BAE = \angle CAE$	Property of angle bisector
$BC = CD$	Property of isosceles triangle
$\angle ABD = 90° + y$	Property of equality
$\angle DAB + \angle ABD + \angle BDA = 180°$ $2x + (90° + y) + y = 180°$ $2x + 2y = 90°$ $x + y = 45°$	Sum of interior angles in $\triangle ABD$ Substitute.
$\angle AEB = x + y$ $\angle AEB = 45°$	$\angle AEB$ is an exterior angle for $\triangle AED$. An exterior angle is equal to sum of the two non-adjacent angles. Substitute.

19. e.g.,



Statement	Justification
$LM = LN$	Property of isosceles triangle
$LR \parallel MN$	Given
$\angle DLR = \angle LMN$	Corresponding angles
$\angle RLN = \angle LNM$	Alternate interior angles
$\angle LMN = \angle LNM$	Property of isosceles triangle
$\angle DLR = \angle RLN$	Transitive property