

Geometry: Angles, Polygons, and Symmetry – AP Book 6.1: Unit 6

AP Book G6-1

page 1

- line segment
2
 - line
0
 - ray
1
- Teacher to check.
Rays should be extended from the arrowhead, not the endpoint.
- Circle the first, second, and fourth pictures.
- Teacher to check.
- Circle the following:
 - first angle
 - first angle
 - first angle
 - first angle
- yes
 - no
- Circle the following:
 - first angle
 - first angle
- Circle the third and sixth angles.
Cross out the fourth angle.

AP Book G6-2

page 3

- 30 degrees
 - 80 degrees
- more than 90°
 - less than 90°
 - more than 90°
 - more than 90°
 - less than 90°
- acute
 - obtuse
 - obtuse
 - obtuse
 - acute
 - acute
- acute
 - obtuse
 - acute
 - obtuse

e) obtuse

f) acute

- acute
 30°
 - obtuse
 120°
 - obtuse
 150°
- acute, 50°
 - acute, 30°
- obtuse, 115°
 - acute, 45°
 - obtuse, 153°
 - obtuse, 104°
- B
 - In A, the angle is below the base line.
In C, the angle is above the base line.
- 30°
 - 130°
 - 55°

AP Book G6-3

page 6

- 45°
 - 134°
 - 90°
- Estimates will vary.
 - Actual: 38°
 - Actual: 117°
 - Actual: 77°
 - Actual: 69°
 - Actual: 154°

BONUS

Actual: 91°

- Circle the second, fourth, and sixth angles.
- Estimates will vary.
- Estimates will vary.
 - Actual: 98°
 - Actual: 43°
 - Actual: 22°
- Teacher to check.
- Answers will vary.
Teacher to check.

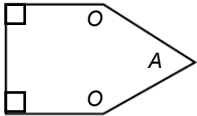
AP Book G6-4

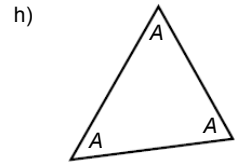
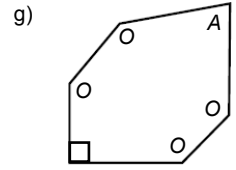
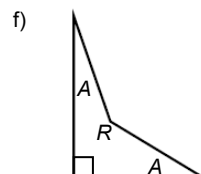
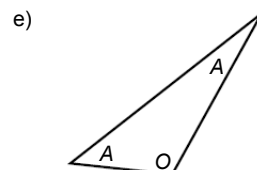
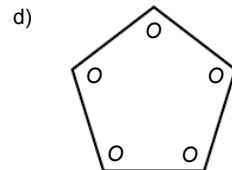
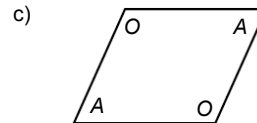
page 8

- 42 mm
 - Teacher to check.
- Teacher to check circling.
 - UVW or WVU
 - FED or DEF
- 45
 - Teacher to check.
- Teacher to check circling.
 - $\angle E, \angle G$
 - $\angle A, \angle Z$
- C
 - A
- Teacher to check.
- Teacher to check.
- Teacher to check.

AP Book G6-5

page 10

- 108°
 - 118°
 - 121°
 - 53°
- 



- Clockwise from top angle: $90^\circ, 56^\circ, 34^\circ$
 - Clockwise from top angle: $65^\circ, 40^\circ, 75^\circ$
- Teacher to check.
 - 90°
 - 90°
- Teacher to check.
- Teacher to check.
 - $\angle F = \angle D = 60^\circ$
 - $\angle G = \angle E = 120^\circ$
 - $FG = 55$ mm
 - The quadrilateral is a rhombus.
- Teacher to check.

AP Book G6-6

page 12

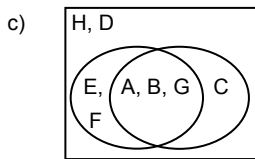
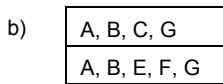
- Teacher to check hash marks.
Side measurements clockwise from top:
 - 30
25
30
25
 - 20
21
37
21
- sides: 28 mm
angles: $60^\circ, 150^\circ, 90^\circ$
equilateral
 - sides: 29 mm
angles: 90°
equilateral
 - sides: 35 mm
angles: 60°
equilateral

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(continued)

- d) sides: 24 mm, 32 mm, 24 mm, 32 mm
angles: 90°
not equilateral
- e) sides: 15 mm, 12 mm, 25 mm, 15 mm, 12 mm, 25 mm
angles: 120°
not equilateral
- f) sides: 25 mm
angles: $85^\circ, 95^\circ$
equilateral

3. a) Circle parts b) and c).
b) parts a) and f)
c) parts d) and e)
4. a) Circle A, B, and G.



- d) the overlap
e) The first Venn diagram's Regular region will always be empty.
5. Teacher to check.

AP Book G6-7

page 14

1. Circle the following shapes:
a) first and second
b) first and third
c) second and third
d) first and third
2. Teacher to check.
3. a) AB, CB
b) AC, BC, AB
4. Teacher to check.
5. a) $\angle A, \angle B$
b) $\angle A, \angle C, \angle B$

6. a) congruent
 $BC = WZ, BD = WY,$
 $CD = ZY, \angle B = \angle W,$
 $\angle D = \angle Y, \angle C = \angle Z$
b) not congruent

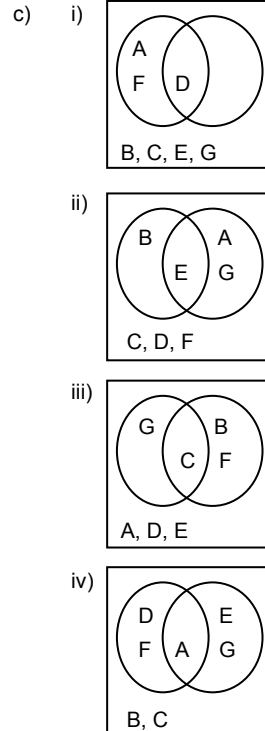
AP Book G6-8

page 16

1. Angle measurements clockwise from top:
a) $88^\circ, 54^\circ$
b) $41^\circ, 119^\circ, 20^\circ$
2. Teacher to check.
3. Teacher to check arcs.
b) acute triangle
c) right triangle
d) obtuse triangle
4. a) acute triangle
b) right triangle
c) acute triangle
d) obtuse triangle
5. Teacher to check.
6. An acute triangle has 3 acute angles. Since an acute triangle is a triangle with the largest angle less than 90° , if any angles are not acute it would not be an acute triangle.
7. Teacher to check hash marks.
a) isosceles
b) equilateral
c) isosceles
d) scalene
8. a) i) scalene
ii) isosceles
iii) equilateral
iv) isosceles
b) i) right
ii) right
iii) acute
iv) acute
9. a) Teacher to check.

Acute	A, D, F
Right	C, G
Obtuse	B, E

Equilat.	D
Isosceles	A, E, G
Scalene	B, C, F



10. They are all acute angles.
11. Answers will vary. Teacher to check.

AP Book G6-9

page 19

1. a) $65^\circ + 50^\circ + 65^\circ = 180^\circ$
b) $45^\circ + 45^\circ + 90^\circ = 180^\circ$
c) $81^\circ + 47^\circ + 52^\circ = 180^\circ$
d) $51^\circ + 94^\circ + 35^\circ = 180^\circ$
e) $34^\circ + 112^\circ + 34^\circ = 180^\circ$

BONUS

$$38^\circ + 52^\circ + 90^\circ = 180^\circ$$

2. a) $60^\circ, 60^\circ, 60^\circ, 180^\circ$
b) $120^\circ, 20^\circ, 40^\circ, 180^\circ$
c) $80^\circ, 90^\circ, 10^\circ, 180^\circ$
3. The sum of the angles in a triangle is 180° .
4. a) $135^\circ + 45^\circ + 135^\circ + 45^\circ = 360^\circ$
b) $90^\circ + 90^\circ + 90^\circ + 90^\circ = 360^\circ$
c) $104^\circ + 76^\circ + 90^\circ + 90^\circ = 360^\circ$
5. a) $60^\circ + 120^\circ + 60^\circ + 120^\circ = 360^\circ$
b) $30^\circ + 150^\circ + 130^\circ + 50^\circ = 360^\circ$
c) $50^\circ + 100^\circ + 130^\circ + 80^\circ = 360^\circ$
6. The sum of the angles in a quadrilateral is 360° .
7. a) 90°
b) 90°
c) 60°
8. a) No. Teacher to check sketch.
b) No. Teacher to check sketch.
9. Teacher to check. Sample answer: The quadrilateral is divided into two triangles. The sum of the angles in a triangle is 180° . $180^\circ + 180^\circ = 360^\circ$.

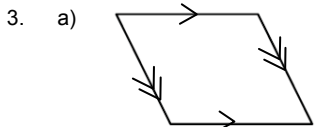
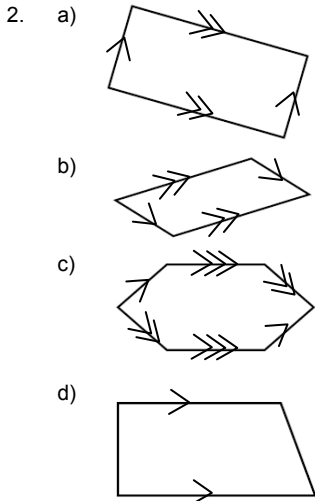
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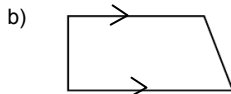
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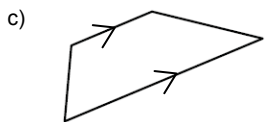
1. Teacher to check line extensions.
Circle parts b) and d).



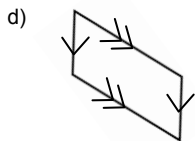
parallelogram



trapezoid



trapezoid



parallelogram

4. a) **K:** 40 mm, 20 mm, 40 mm, 20 mm
L: 20 mm, 50 mm
M: 25 mm, 35 mm
N: 37 mm, 23 mm, 37 mm, 23 mm

b)

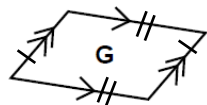
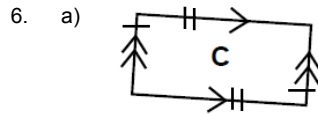
Parallel.	K, N
Trapezoid	L, M

Parallel sides equal	K, N
Parallel sides not equal	L, M

- c) They are the same. Parallelograms have parallel sides that are equal, and trapezoids have parallel sides that are not equal.

- d) i) 60
56
trapezoid
ii) 40
40
parallelogram

5. Rob is not correct. The parallel sides are not an equal length, so there is only one set of parallel sides. It is a trapezoid.



- b) Colour C, F, and G red.
Colour A, B, D, and E blue.

c)

No equal sides	D
Exactly 2 equal sides	A, B
Exactly 3 equal sides	E, I
4 equal sides	F
2 different pairs	C, G, H

- d) 4
e) 3

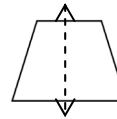
7. a) yes
b) no

8. a) Teacher to check.
b) D
c) A, E
9. a) i) $60^\circ, 120^\circ, 60^\circ$
ii) $70^\circ, 110^\circ, 70^\circ, 110^\circ$
iii) $90^\circ, 90^\circ, 90^\circ, 90^\circ$
b) they are equal
c) no

AP Book G6-11

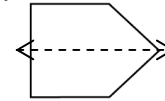
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1. a) yes
b) no
c) yes
d) no
2. a) **A.** yes



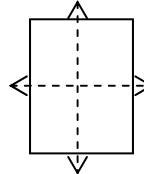
B. no

C. yes

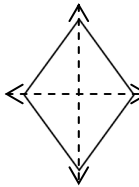


D. no

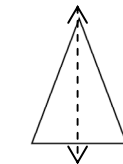
- b) **E.**



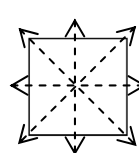
F.



G.



H.



c)

B, D	A, C, G	E, F	H
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3. a) Teacher to check.
b) It is not a regular pentagon. Opposite sides and angles are equal.
c) Teacher to check.
d) no
e) no
f) Answers will vary. Teacher to check.

4. Circle the second, third, sixth, and eighth shapes. Shade the second, fourth, fifth, and sixth shapes.

5. a) 3, 5, 2, 6
5, 4, 2, 1
4, 1, 4, 1
b) 1: H, J, L
2: C, G
3: A
4: F, I
More than 4: B, D, E

c) H, J

d) K

e) L

BONUS

Amy is not correct. Counterexample: shape L has rotational symmetry of order 1, but 0 lines of symmetry.

6. a) Teacher to check.
b) 3, 4, 5, 6

c)

M	N	O	P
3	4	5	6
3	4	5	6
3	4	5	6

d) 8, 8

e) 20, 20

7. Answers will vary. Teacher to check.

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1. a) 1 pair

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(continued)

- b) Circle *B* and *C*.
2. a) 4
b) yes
c) Circle *F* and *G* or *E* and *H*.
3. a) Cross out the first diagram.
b) Teacher to check.
4. a) i) rhombus
ii) not a rhombus
iii) rhombus
b) yes
c) Teacher to check.
5. a) Answers will vary. Teacher to check.
b) i) overlap
ii) overlap
iii) outside region
iv) overlap
6. a) A rectangle is a parallelogram because a rectangle is a quadrilateral with 4 right angles. If two lines both meet a third line at a right angle, the two lines are parallel. Since all lines in a rectangle meet at 90° , a rectangle is a parallelogram.
b) Since a rectangle is a parallelogram, its opposite sides are equal and therefore also have lengths of 15 cm and 6 cm.
7. a) Yu is correct. 360° divided into 4 equal groups is 90° .
b) There cannot be a quadrilateral with exactly 3 right angles. If 3 angles are right, then the fourth angle must also be 90° , so it would have 4 right angles.

BONUS

- Since opposite angles in a parallelogram are equal, if a parallelogram has 2 right angles the other 2 must also be right, so the parallelogram would be a rectangle.
8. a) Yes. A square is also a parallelogram since a square is an equilateral rectangle.
b) No. A square must have two pairs of parallel lines.
c) Teacher to check that the overlap is shaded.
d) No. Squares are rectangles with equal sides, or rhombuses with 4 equal angles.