Answer Key

GRADE 4 • MODULE 4

Angle Measure and Plane Figures

engageny

Lesson 1

Problem Set

1. a. – f. Figure drawn accurately

   g. Answers will vary.

2. a. – g. Figure drawn accurately

   h. Answers will vary.

3. a. Points labeled; labels will vary.

   b. Answers will vary.

Exit Ticket

1. Words connect to corresponding pictures

2. Answers will vary.

Homework

1. a. – f. Figure drawn accurately

   g. Answers will vary.

2. a. – g. Figure drawn accurately

   h. Answers will vary.

3. a. Points labeled; labels will vary.

   b. Answers will vary.

Lesson 2

Problem Set

1. a. Answer provided
    b. Less than; acute
    c. Equal to; right
    d. Greater than; obtuse
    e. Greater than; obtuse
    f. Equal to; right
    g. Greater than; obtuse
    h. Greater than; obtuse
    i. Less than; acute
    j. Less than; acute

2. Angles accurately identified and traced; points labeled; angles named; answers will vary.

3. a. Acute angle constructed; less than a right angle
    b. Right angle constructed; equal to a right angle
    c. Obtuse angle constructed; greater than a right angle

Exit Ticket

1. a. Right
    b. Acute
    c. Obtuse

2. a. C, G
    b. B, E
    c. A, D
    d. F, H

Homework

1. a. Answer provided
    b. Equal to; right
    c. Greater than; obtuse
    d. Greater than; obtuse
    e. Less than; acute
    f. Greater than; obtuse
    g. Equal to; right
    h. Less than; acute
    i. Greater than; obtuse
    j. Equal to; right

2. Angles accurately identified and traced; points labeled; angles named; answers will vary.

3. a. Acute angle constructed; less than a right angle
    b. Right angle constructed; equal to a right angle
    c. Obtuse angle constructed; greater than a right angle

Lesson 3

Problem Set

1. Perpendicular lines accurately traced

2. Answers will vary.

3. Perpendicular lines accurately drawn

4. a. Right angles accurately identified and marked; $\overline{BD} \perp \overline{DC}$; $\overline{AC} \perp \overline{CD}$; $\overline{BA} \perp \overline{CA}$

   b. No right angles

   c. Right angle accurately identified and marked; $\overline{GE} \perp \overline{EF}$

   d. No right angles

   e. Right angles accurately identified and marked; $\overline{FW} \perp \overline{WA}$; $\overline{ZF} \perp \overline{FW}$; $\overline{AZ} \perp \overline{ZF}$; $\overline{WA} \perp \overline{AZ}$

   f. No right angles

   g. No right angles

   h. Right angles accurately identified and marked; $\overline{YX} \perp \overline{XW}$; $\overline{XW} \perp \overline{WV}$; $\overline{YU} \perp \overline{UV}$

5. Right angles accurately identified and marked; 12 perpendicular pairs

6. True; explanations will vary.

Exit Ticket

1. Right angles accurately identified and marked; $\overline{BC} \perp \overline{CD}$; $\overline{CD} \perp \overline{DE}$; $\overline{BA} \perp \overline{AE}$

2. Right angles accurately identified and marked; $\overline{MN} \perp \overline{MP}$

Homework

1. Perpendicular lines accurately traced

2. Answers will vary.

3. Perpendicular lines accurately drawn

4. a. Right angles accurately identified and marked; $\overline{AB} \perp \overline{BD}$; $\overline{BD} \perp \overline{DC}$; $\overline{AC} \perp \overline{CD}$

   b. No right angles

   c. Right angle accurately identified and marked; $\overline{DO} \perp \overline{OG}$

   d. No right angles

   e. No right angles

   f. Right angles accurately identified and marked; $\overline{PO} \perp \overline{ON}$; $\overline{ON} \perp \overline{NM}$; $\overline{NM} \perp \overline{MP}$; $\overline{MP} \perp \overline{PO}$

   g. No right angles

   h. Right angles accurately identified and marked; $\overline{UT} \perp \overline{TZ}$; $\overline{TZ} \perp \overline{ZY}$; $\overline{ZY} \perp \overline{YX}$; $\overline{YX} \perp \overline{XW}$

5. Right angles accurately identified and marked; 8 perpendicular pairs

6. True; explanations will vary.

Lesson 4

Problem Set

1. Parallel lines accurately traced

2. Answers will vary.

3. Parallel lines accurately drawn

4. a. Lines accurately identified and marked with arrows; $\overline{AC} \parallel \overline{BD}$

    b. Circled; lines accurately identified and marked with arrows; $\overline{HI} \parallel \overline{JK}$

    c. No parallel lines

    d. No parallel lines

    e. Circled; lines accurately identified and marked with arrows; $\overline{ZA} \parallel \overline{FW}$; $\overline{ZF} \parallel \overline{AW}$

    f. No parallel lines

    g. Circled; lines accurately identified and marked with arrows; $\overline{TO} \parallel \overline{RQ}$; $\overline{ST} \parallel \overline{QP}$; $\overline{SR} \parallel \overline{OP}$

    h. Circled; lines accurately identified and marked with arrows; $\overline{YX} \parallel \overline{VW}$

5. True; explanations will vary.

6. Explanations will vary.

7. Parallel lines constructed

Exit Ticket

1. Parallel

2. Perpendicular

3. Intersecting

4. Intersecting

Homework

1. Parallel lines accurately traced

2. Answers will vary.

3. Parallel lines accurately drawn

4. a. Lines accurately identified and marked with arrows; $\overline{AB} \parallel \overline{CD}$

   b. Circled; lines accurately identified and marked with arrows; $\overline{HI} \parallel \overline{JK}$

   c. No parallel lines

   d. No parallel lines

   e. No parallel lines

   f. Circled; lines accurately identified and marked with arrows; $\overline{OP} \parallel \overline{MN}$; $\overline{ON} \parallel \overline{PM}$

   g. Circled; lines accurately identified and marked with arrows; $\overline{TU} \parallel \overline{RQ}$; $\overline{ST} \parallel \overline{QP}$; $\overline{SR} \parallel \overline{UP}$

   h. Circled; lines accurately identified and marked with arrows; $\overline{TZ} \parallel \overline{XY}$; $\overline{TU} \parallel \overline{ZY}$; $\overline{WX} \parallel \overline{ZY}$

5. False; explanations will vary.

6. Explanations will vary.

7. Parallel lines constructed

Lesson 5

Problem Set

1. a. 135°, 180°, 225°, 270°, 315°, 360°

    b. 90°, 120°, 150°, 180°, 210°, 240°, 270°, 300°, 330°, 360°

2. 90°, 180°, 270°, 360°; answers will vary.

3. 30°, 45°, 60°

4. 120°, 135°, 150°

5. $\dfrac{30}{360}$, $\dfrac{45}{360}$, $\dfrac{60}{360}$, $\dfrac{90}{360}$, $\dfrac{120}{360}$, $\dfrac{135}{360}$, $\dfrac{150}{360}$, $\dfrac{180}{360}$, $\dfrac{210}{360}$, $\dfrac{225}{360}$, $\dfrac{240}{360}$, $\dfrac{270}{360}$, $\dfrac{300}{360}$, $\dfrac{315}{360}$, $\dfrac{330}{360}$, $\dfrac{360}{360}$

6. 8

7. 12

8. Explanations will vary.

Exit Ticket

1. 4

2. 90°

3. $\dfrac{1}{360}$

4. Answers will vary.

Homework

1. a. 60°

    b. 130°

    c. 315°

    d. 120°

2. Explanations will vary.

Lesson 6

Problem Set

1.
a. 32°
b. 36°
c. 90°
d. 90°
e. 36°
f. 155°
g. 155°
h. 90°
i. 90°
j. 150°

2.
a. 30°, 30°, 30°
b. Answers will vary.

3.
a. 180°
b. 178°; explanations will vary.

Exit Ticket

1. 135°
2. 150°
3. 37°
4. 90°

Homework

1.
a. 67°
b. 78°
c. 32°
d. 60°
e. 105°
f. 153°
g. 135°
h. 65°
i. 45°
j. 118°

2. Explanations will vary.

3.
a. 180°
b. 180°; explanations will vary.

Lesson 7

Problem Set

1. 30° angle constructed
2. 65° angle constructed
3. 115° angle constructed
4. 135° angle constructed
5. 5° angle constructed
6. 175° angle constructed
7. 27° angle constructed
8. 117° angle constructed
9. 48° angle constructed
10. 132° angle constructed

Exit Ticket

1. 75° angle constructed
2. 105° angle constructed
3. 81° angle constructed
4. 99° angle constructed

Homework

1. 25° angle constructed
2. 85° angle constructed
3. 140° angle constructed
4. 83° angle constructed
5. 108° angle constructed
6. 72° angle constructed
7. 25° angle constructed
8. 155° angle constructed
9. 45° angle constructed
10. 135° angle constructed

Lesson 8

Problem Set

1. Fence, tree, barn

2. 270°

3. Full turn

4. Towards his house

5. Picture shows a 270° turn.

6. 4 quarter turns

7. 1 counter-clockwise or 3 clockwise quarter turns

8. West

Exit Ticket

1. 180°

2. East

Homework

1. House, fence, house

2. 360°

3. Opposite direction; explanations will vary.

4. Full turn

5. Picture shows a 180° turn.

6. 4 quarter turns

7. 2 quarter turns

8. West

Lesson 9

Problem Set

1. a. 4; 4, 90°; 90°, 90°, 90°, 90°

   b. 6; 360° ÷ 6 = 60°; 60°+ 60° + 60° + 60° +60° + 60° = 360°

   c. 3; 360° ÷ 3 = 120°; 120°, 120°, 120°

   d. 6; 360° ÷ 6 = 60°; 60°+ 60° + 60° + 60° +60° + 60° = 360°

   e. 3; 360° ÷ 3 = 120°; 120° + 120° + 120° = 360°

   f. 12; 360° ÷ 12 = 30°; 30° + 30° + 30° + 30° + 30° + 30° + 30° + 30° + 30° + 30° + 30° + 30° = 360°

2. a. 150°; 60° + 90° = 150°

   b. 180°; 60° + 120° = 180°

   c. 210°; 120° + 90° = 210°

3. a. 60°; 30° + 30° = 60°

   b. 210°; 120° + 90° = 210°

   c. 120°; 90° + 30° = 120°

Exit Ticket

1. Answers will vary.

2. Answers will vary.

Homework

1. Answers will vary.

2. Answers will vary.

3. Answers will vary.

4. Answers will vary.

5. a. Answer provided

   b. 30° + 60°; 90°

   c. 120° + 60° + 30°; 210°

Lesson 10

Problem Set

1. 45°; 45°
2. 20°, 70°, 90°; 70°
3. 110°; 110°
4. 83°, 97°, 180°; 97°
5. Equations will vary; 54°

6. Equations will vary; 12°
7. Equations will vary; 63°
8. a.–d. Figure accurately constructed
   e. Answers will vary.
   f. Equations will vary.

Exit Ticket

Equations will vary; 60°

Homework

1. 55°; 55°
2. 62° + 28° = 90°; 28°
3. 35°; 35°
4. 16°, 164°, 180° ; 164°
5. Equations will vary; 75°

6. Equations will vary; 35°
7. Equations will vary; 16°
8. a.–d. Figure accurately constructed
   e. Answers will vary.
   f. Equations will vary.

Lesson 11

Problem Set

1.   340; 340
2.   270, 90; 270
3.   74, 90, 196, 360; 196
4.   90°, 160°, 110°; 360°; 110°
5.   Equations will vary; 160°; 20°
6.   Equations will vary; 55°; 125°; 55°
7.   Equations will vary; 36°; 54°; 144°

Exit Ticket

1.   Equations will vary; 24°
2.   Equations will vary; 156°
3.   Equations will vary; 24°

Homework

1.   40; 40
2.   45, 315; 315
3.   115, 100, 145, 360; 145
4.   135°, 145°, 80°, 360°; 80°
5.   Equations will vary; 145°; 35°
6.   Equations will vary; 125°; °125°; 55°
7.   Equations will vary; 44°; 46°; 134°

Lesson 12

Problem Set

1. (a), (b), and (d) circled

2. a. Line of symmetry accurately drawn; 1

    b. Lines of symmetry accurately drawn; 4

    c. 0

    d. Lines of symmetry accurately drawn; 6

    e. Line of symmetry accurately drawn; 1

    f. 0

    g. Line of symmetry accurately drawn; 1

    h. Line of symmetry accurately drawn; 1

    i. Lines of symmetry accurately drawn; 4

3. Symmetric figures accurately drawn

4. Infinite; explanations will vary.

Exit Ticket

1. No; yes; no

2. 4 lines of symmetry accurately drawn

Homework

1. (a) and (c) circled

2. a. Line of symmetry accurately drawn; 1

    b. Lines of symmetry accurately drawn; 4

    c. Lines of symmetry accurately drawn; 8

    d. Line of symmetry accurately drawn; 5

    e. 0

    f. 0

    g. Lines of symmetry accurately drawn; 2

    h. Line of symmetry accurately drawn; 1

    i. Line of symmetry accurately drawn; 1

3. Symmetric figures accurately drawn

4. No; explanations will vary.

Lesson 13

Problem Set

1. a. Isosceles; obtuse
   b. Equilateral; acute
   c. Scalene; right
   d. Scalene; obtuse

2. $\angle A = \angle C$; explanations will vary.

3. a. Answers will vary.
   b. Each side length labeled as 10 cm

4. Answers will vary.

5. a. G, I, H
   b. Answers will vary.

6. No; explanations will vary.

Exit Ticket

1. Acute; isosceles; right

2. a. Right, scalene
   b. Obtuse, isosceles
   c. Acute, equilateral

3. Lines of symmetry accurately drawn in triangle (b) and (c)

Homework

1. a. Scalene; right
   b. Scalene; obtuse
   c. Isosceles; acute
   d. Equilateral; acute

2. a. $\angle A = \angle C$
   b. Answers will vary.

3. Answers will vary.

4. 5 cm

5. No; explanations will vary.

6. No; explanations will vary.

Lesson 14

Problem Set

1.   Triangles accurately drawn; side lengths and angles labeled
2.   Lines of symmetry accurately drawn in 1(a) and 1(d); explanations will vary.
3.   False; explanations will vary.
4.   True; explanations will vary.
5.   True; explanations will vary.
6.   True; explanations will vary.

Extension: True; explanations will vary.

Exit Ticket

1.   Triangle accurately drawn with 1 line of symmetry
2.   Triangle accurately drawn with no lines of symmetry
3.   2

Homework

1.   Triangles drawn accurately; side lengths and angles labeled
2.   Lines of symmetry accurately drawn in 1(a) and 1(c); explanations will vary.
3.   True; explanations will vary.
4.   False; explanations will vary.
5.   True; explanations will vary.
6.   False; explanations will vary.

Extension: False; explanations will vary.

Lesson 15

Problem Set

1. Figure accurately constructed; trapezoid

2. Figure accurately constructed; parallelogram

3. Figure accurately constructed; rectangle

4. Figure accurately constructed; square

5. a. Trapezoid

   b. Parallelogram

   c. Square

   d. Rectangle

6. Sides of equal length; explanations will vary.

7. Four right angles; explanations will vary.

8. Two sets of parallel sides; explanations will vary.

Exit Ticket

1. Figure accurately constructed

2. Four right angles; answers will vary.

Homework

1. a. Trapezoid

   b. Parallelogram

   c. Square

   d. Rectangle

2. Sides of equal length; explanations will vary.

3. Four right angles; explanations will vary.

4. Two parallel pairs; explanations will vary.

5. a. Figure accurately constructed; square

   b. Figure accurately constructed; parallelogram (or rectangle or square)

   c. Figure accurately constructed; trapezoid

   d. Figure accurately constructed; rectangle (or square)

Lesson 16

Problem Set

1. a. Figure accurately constructed; figures will vary; answers will vary.

   b. Figure accurately constructed; figures will vary; answers will vary.

   c. Figure accurately constructed; figures will vary; answers will vary.

   d. Figure accurately constructed; figures will vary; answers will vary.

2. a. Figure accurately constructed; figures will vary; answers will vary.

   b. Figure accurately constructed; figures will vary; answers will vary.

3. Answers will vary.

4. Answers will vary.

Exit Ticket

1. Parallelogram accurately constructed; figures will vary; answers will vary.

2. Rectangle accurately constructed; figures will vary; answers will vary.

Homework

1. Figure accurately constructed; figures will vary; trapezoid

2. Figure accurately constructed; figures will vary; rectangle.

3. Figure accurately constructed; Figures will vary; parallelogram

4. Figure accurately constructed; figures will vary; rhombus

5. Figure accurately constructed; figures will vary; square

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