Student Guide

Measuring and Estimating Angles

Questions 1–20 (SG pp. 384–393)

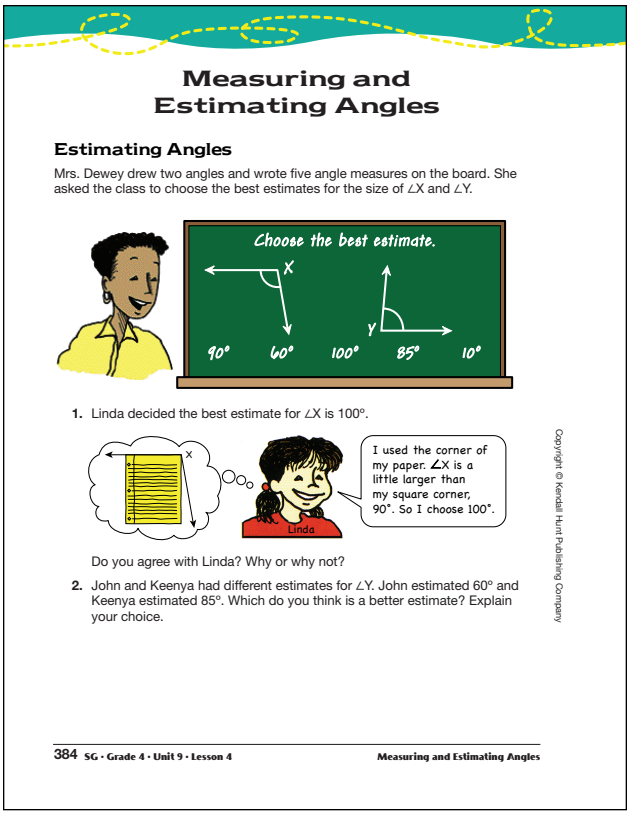
1. Yes; ∠X is a little larger than 90°, and 100° is the only choice that is above 90°.
2. Keenya's estimate is better; ∠Y is only a little smaller than 90°, so 85° is a better estimate than 60°.
3. ∠YXW is a little under 90°, so it is around 85°.

   ∠S is a little over 90°, so it is around 95°.

   ∠Z is a little under 180°, so it is around 170°.

   The inside of ∠R is 90°, so it is 360° – 90° = 270°.

   ∠TUV is about halfway between 90° and 180°, so it is around 135°.
4. Ana is right that ∠R is more than 90°, but it is actually quite a bit more, not a little as she says. The opposite side of the angle is 90°, so ∠R is 360° – 90° = 270°.
5. Less than 90°
6. ∠ABC is about halfway between 45° and 90°.
7. 70°



Measuring and Estimating Angles

Estimating Angles

Mrs. Dewey drew two angles and wrote five angle measures on the board. She asked the class to choose the best estimates for the size of ∠X and ∠Y.

1. Linda decided the best estimate for ∠X is 100°.

Do you agree with Linda? Why or why not?

2. John and Keenya had different estimates for ∠Y. John estimated 60° and Keenya estimated 85°. Which do you think is a better estimate? Explain your choice.

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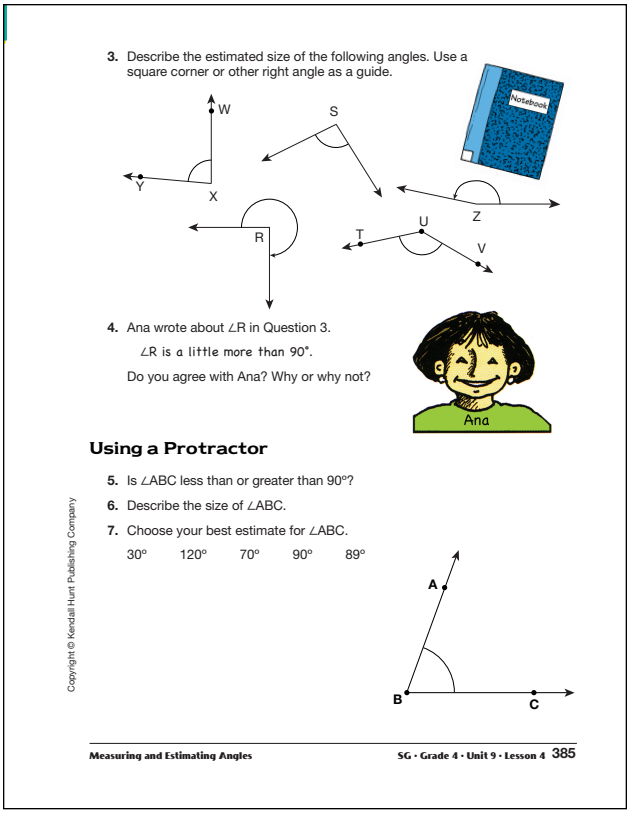

3. Describe the estimated size of the following angles. Use a square corner or other right angle as a guide.

4. Ana wrote about ∠R in Question 3.

   ∠R is a little more than 90°.

   Do you agree with Ana? Why or why not?

Using a Protractor

5. Is ∠ABC less than or greater than 90°?
6. Describe the size of ∠ABC.
7. Choose your best estimate for ∠ABC.

   30° 120° 70° 90° 89°

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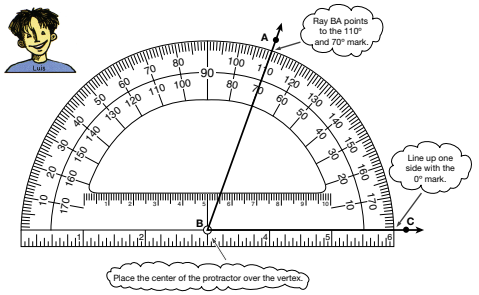
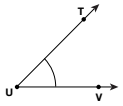
Luis used a **protractor** and the following steps to find the degree measure of ∠ABC.



- He placed the center of the protractor over the vertex of the angle.
- $\overline{BC}$ lined up with the 0° mark on the right side of the protractor. He began at 0° and read the degree marks until he reached $\overline{AB}$.
- Since the angle was less than 90°, Luis decided that ∠ABC measured 70°.

8. Look back at your estimate of ∠ABC in Question 7. Did you make a reasonable estimate?
9. Look at ∠TUV. Is ∠TUV less than or greater than 90°?
10. Describe the size of ∠TUV.



11. Choose your best estimate for ∠TUV.

75° 45° 90° 120° 20°

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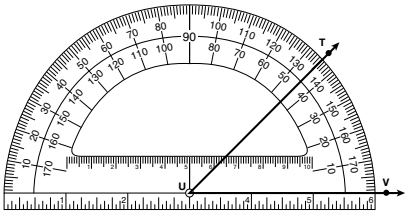
8. Answers will vary.
9. Less than 90°
10. ∠TUV is about halfway between 0° and 90°.
11. 45°
12. **A.** ∠TUV is under 90°, so it is between 40° and 50°.
    B. 45°
    C. Answers will vary.
13. **A.** Greater than 90°
    B. It is clearly greater than 90°, but closer to 90° than 180°.
    C. 120°
14. **A.** ∠DEF is greater than 90°, so it is between 120° and 130°.
    B. 123°
    C. The estimate of 120° is very close.
15. **A.** It is about halfway between 270° and 360°.
    B. 330°

12. A protractor is used to measure ∠TUV.

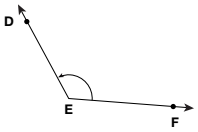


A. Look where ray $\overrightarrow{UT}$ is pointing. The angle's measurement is either between 40° and 50° or 130° and 140°. Which is it?

B. Read the numbers starting with the 0° mark. If each mark is 1°, what is the angle measure for ∠TUV?

C. Look back at your estimate in Question 11. Did you make a reasonable estimate?

13. Look at ∠DEF.



A. Is ∠DEF less than or greater than 90°?

B. Describe the size of ∠DEF.

C. Choose your best estimate.

65° 95° 120° 160° 30°

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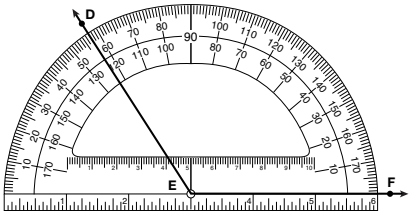
14. A protractor is used to measure ∠DEF.

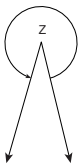


A. Look where ray $\overrightarrow{ED}$ is pointing. The angle's measurement is either between 50° and 60° or 120° and 130°. Which is it?

B. Read the numbers starting with the 0° mark. If each mark is 1°, what is the angle measure for ∠DEF?

C. Compare your measurement to your estimate.

15. Look at ∠Z.



A. Describe the size of ∠Z.

B. Choose your best estimate.

30° 60° 350° 270° 330°

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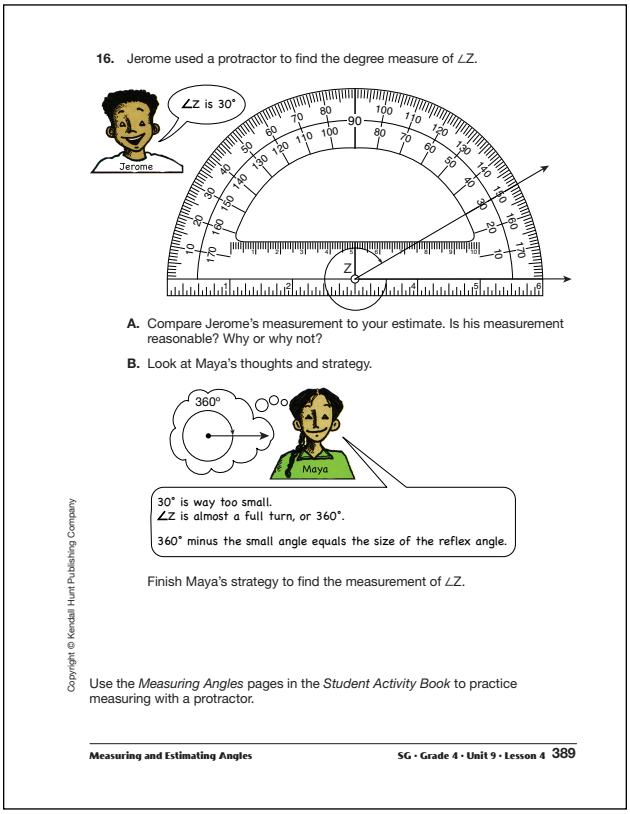
16. A. Jerome's measurement is wrong. He is measuring the inside of the angle, instead of the outside.

B. 360° – 30° = 330°

17.* See lesson Jackie read the wrong set of numbers.

18. Drawings will vary. Students should correctly identify each type of angle, name each ray, and indicate the measurement of each using the degree label appropriately. One of the three angles should have the vertex on the right side and one on the left.

19. Drawings and number sentences will vary. Using Maya's strategy, a possible number sentence for a reflex angle measuring 270° is 360° − 90° = 270°.


16. Jerome used a protractor to find the degree measure of ∠Z.

A. Compare Jerome's measurement to your estimate. Is his measurement reasonable? Why or why not?

B. Look at Maya's thoughts and strategy.

Finish Maya's strategy to find the measurement of ∠Z.

Use the *Measuring Angles* pages in the *Student Activity Book* to practice measuring with a protractor.

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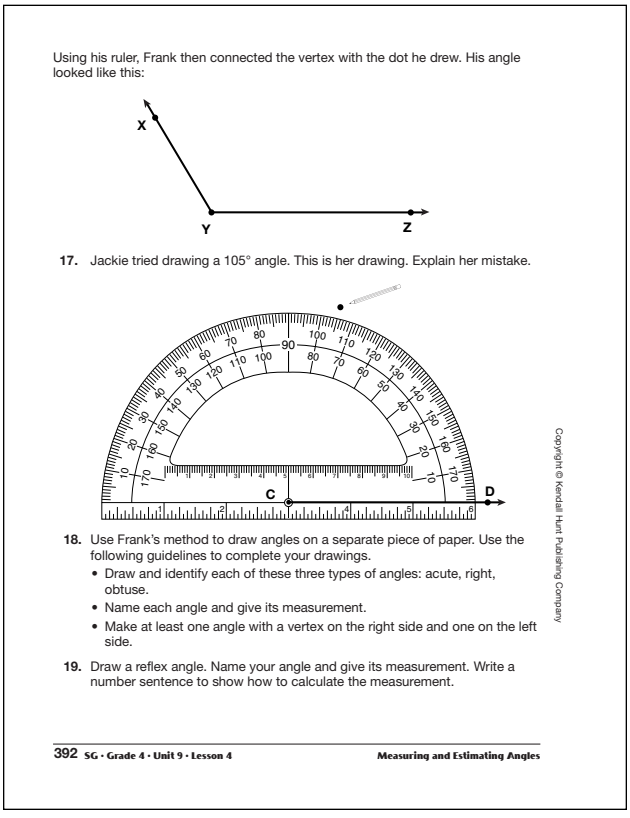
Using his ruler, Frank then connected the vertex with the dot he drew. His angle looked like this:

17. Jackie tried drawing a 105° angle. This is her drawing. Explain her mistake.

18. Use Frank's method to draw angles on a separate piece of paper. Use the following guidelines to complete your drawings.
- Draw and identify each of these three types of angles: acute, right, obtuse.
- Name each angle and give its measurement.
- Make at least one angle with a vertex on the right side and one on the left side.

19. Draw a reflex angle. Name your angle and give its measurement. Write a number sentence to show how to calculate the measurement.

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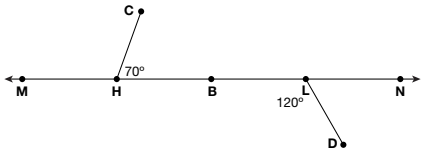
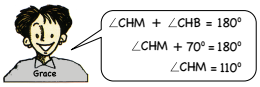
***Answers and/or discussion are included in the lesson.**

20. Grace drew this:



She made ∠CHB 70°. Look at Grace's thinking to determine the measurement of ∠CHM.



A. Do you agree with Grace? Measure to check her calculations.

B. Write a different number sentence to determine the measurement of ∠CHM.

C. What is the measure of ∠DLN ?

D. Write a number sentence to calculate the measurement of ∠DLN.

Use the *Draw and Solve Problems with Angles* pages in your *Student Activity Book* to practice drawing angles and using number sentences to determine the measurement of angles.

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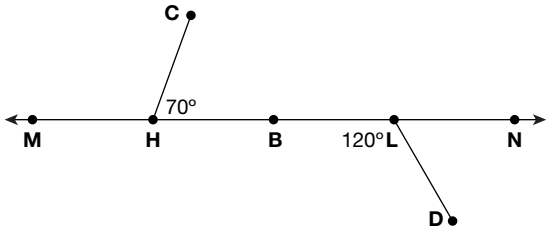
20.



A. Students should agree with Grace's thinking, recognizing that MB is 180º, thus calculations can be made following Grace's strategy to determine the measurement of ∠CHM.

B. 180º – 70º = 110º

C. 60º

D. Possible response: 180º – 120º = 60º

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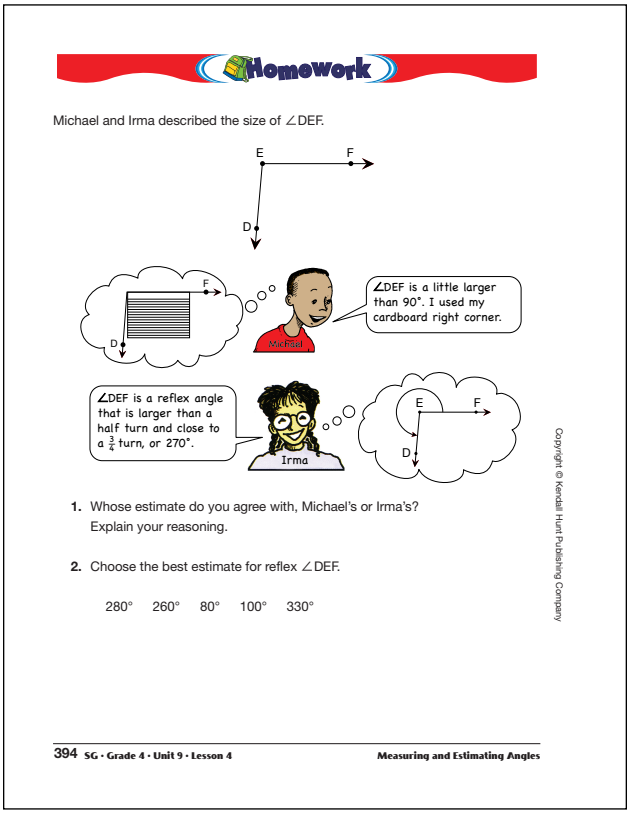
Homework

Questions 1–6 (SG pp. 394–395)

1. Michael's estimate is correct for the angle ∠DEF as it is shown, Irma's estimate is correct for the reflex of ∠DEF.
2. 260°
3. true; false; false; true; true
4. true; true; true; false
5. false; true; true; true
6. true; false; false; true


Homework

Michael and Irma described the size of ∠DEF.

E F D

F D Michael ∠DEF is a little larger than 90°. I used my cardboard right corner.

∠DEF is a reflex angle that is larger than a half turn and close to a $\frac{3}{4}$ turn, or 270°. Irma E F D

1. Whose estimate do you agree with, Michael's or Irma's? Explain your reasoning.
2. Choose the best estimate for reflex ∠DEF.

280° 260° 80° 100° 330°

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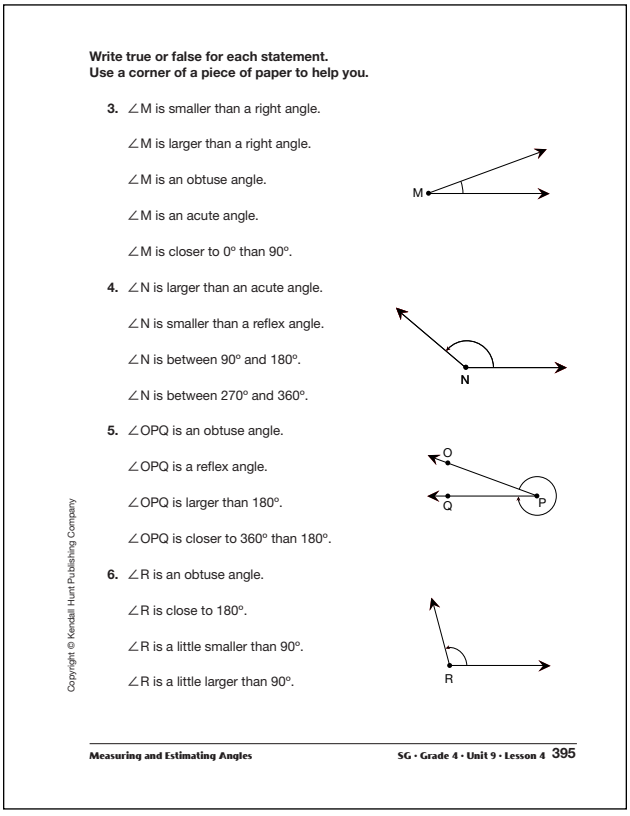
Write true or false for each statement.
Use a corner of a piece of paper to help you.

3. ∠M is smaller than a right angle.
   ∠M is larger than a right angle.
   ∠M is an obtuse angle.
   ∠M is an acute angle.
   ∠M is closer to 0° than 90°.

M

4. ∠N is larger than an acute angle.
   ∠N is smaller than a reflex angle.
   ∠N is between 90° and 180°.
   ∠N is between 270° and 360°.

N

5. ∠OPQ is an obtuse angle.
   ∠OPQ is a reflex angle.
   ∠OPQ is larger than 180°.
   ∠OPQ is closer to 360° than 180°.

O Q P

6. ∠R is an obtuse angle.
   ∠R is close to 180°.
   ∠R is a little smaller than 90°.
   ∠R is a little larger than 90°.

R

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