Grade 8 Unit 8: Pythagorean Theorem and Irrational Numbers
Lessons 1–5: Side Lengths and Areas of Squares

Explore, Play, and Discuss

- I can find the area of a tilted square on a grid by using methods like "decompose and rearrange" and "surround and subtract."
- I can explain what a square root is.

Activity Suggestions:

- ➢ Activity 1 from the Grade 8 Unit 8 family materials: Use the overview to build understanding and then try the sample activity before checking the solution.
- ➢ Activity 1.3: Students respond to questions in an online journal or with someone at home.
- ➢ Activity 2.2: Students can create graphs using online graphing or drawing tools to estimate areas.

Assessment Suggestions:

- ➢ Check Your Readiness assessment: Administer all 7 items within the first day or two of this section. Use the guidance provided with each problem to adjust instruction so that students can access the math in the unit.

Deep Dive

- I can explain what a square root is.
- I know what an irrational number is and can give an example.
- I know what a rational number is and can give an example.
- I can plot square roots on the number line.
- When I have a square root, I can reason about which two whole numbers it is between.

Activity Suggestions:

- ➢ Activity 2.3: Students can create graphs using online graphing tools. Sync discussion. Focus on students describing the relationship from the graph.
- ➢ Activity 3.3: Sync discussion. Refer to perfect squares and enlist students to share their reasoning
- ➢ Lesson 4: Sync discussion

Assessment Suggestions:

- ➢ Lesson 3 cool-down
- ➢ Lesson 4 cool-down
- ➢ Lesson 5 practice problems 5 and 6

Synthesize and Apply

- When I have a square root, I can reason about which two whole numbers it is between.

Activity Suggestions:

- ➢ Activity 5.3: Students can use an online graphing tool for plotting on the number line. Have students share their reasoning in an online or paper journal for question 1.

Assessment Suggestions:

- ➢ Lesson 5 Activity 2
- ➢ Lesson 5 cool-down
- ➢ Lesson 5 practice problems 1–3
- ➢ Students use learning targets to decide what additional practice they need.
- ➢ Students can annotate student lesson summaries for Lessons 1–5 and provide a summary of the first section of the unit using an online journal

Ongoing Practice

- Assign one or more of the distributed practice problem sets from Lessons 1–5 to be completed over the time period that the section is being worked on.
- Have students write all of the integers that are perfect squares from 1–400 to help with future lessons.
- Specify which problems students should submit, or let them choose.

Anytime Resources

- Delve into one of the culminating lessons from units 6 or 7.

Lessons 6–11: The Pythagorean Theorem

Explore, Play, and Discuss

- I can explain what the Pythagorean Theorem says.

Activity Suggestions:

- ➢ Lesson 6: Consider how to present the launch from 6.2 as a worked example.
- ➢ Task 2 from Unit 8 family materials. Have students work with a family member before the solution is presented.

Assessment Suggestions:

- ➢ Lesson 6 cool-down

Deep Dive

- I can explain why the Pythagorean Theorem is true.
- If I know the lengths of two sides, I can find the length of the third side in a right triangle.
- I can explain why it is true that if the side lengths of a triangle satisfy the equation $a^2 + b^2 = c^2$, then it must be a right triangle.

Activity Suggestions:

- ➢ Activity 7.2: This activity formally introduces an algebraic proof for The Pythagorean Theorem. Sync discussion. Present an incorrect solution for students to explain their reasoning.
- ➢ Activity 8.3: This activity gives students practice with finding missing side lengths using Pythagorean Theorem.
- ➢ Activity 9.3: This activity allows students to see formally the Pythagorean Theorem and its converse. Students should have access to calculators. Sync discussion inviting multiple students to share their solutions to the problems.

Assessment Suggestions:

- ➢ Lesson 8 cool-down
- ➢ Lesson 9 practice problems 1–4

Synthesize and Apply

- I can use the Pythagorean Theorem to solve problems.
- I can find the distance between two points in the coordinate plane.
- I can find the length of a diagonal line segment in the coordinate plane.

Activity Suggestions:

- ➢ Activity 10.2.
- ➢ Activity 11.4: Have multiple students share their thinking for question 2

Assessment Suggestions:

- ➢ Lesson 10 cool-down
- ➢ Revisions to previous assessment prompts
- ➢ Have students annotate and summarize the student summary for Lesson 11 in an online or paper journal
- ➢ Students use learning targets to decide what additional practice they need.

Ongoing Practice

- Assign one or more of the distributed practice problem sets from Lessons 6–11 to be completed over the time period that the section is being worked on.
- These could also be lagging, so that students are working on practice problems from the previous section or unit during this section or unit.
- Specify which problems students should submit, or let them choose.

Anytime Resources

- Delve into one of the culminating lessons from units 6 or 7.
- Look for right triangles at home or in everyday contexts to gain more representation of Pythagorean Theorem.

Lessons 12–16: Side Lengths and Volume of Cubes, Decimal Representation of Rational and Irrational Numbers

Explore, Play, and Discuss

- I know what a cube root is.
- I can write a fraction as a repeating decimal
- I can write a repeating decimal as a fraction

Activity Suggestions:

- ➢ Task 3 in the Unit 8 family materials. Have students discuss with a family member cube roots and placement on a number line. Use the overview to build understanding and then try the sample activity before checking the solution.
- ➢ Activity 12.1: Warm-up introduces cube roots.
- ➢ Activity 12.3: Card Sort
- ➢ Activity 14.3: Complete the activity without calculators.

Assessment Suggestions:

- ➢ Lesson 12 cool-down

Deep Dive

- When I have a cube root, I can reason about which two whole numbers it is between.
- I understand the meaning of expressions like $\sqrt[3]{5}$
- I understand that every number has a decimal expansion

Activity Suggestions:

- ➢ Activity 13.3: Students should not use calculators. Sync discussion and allow multiple students to share for question 1.
- ➢ Activity 14.3 Synthesis: Sync discussion allowing students to share responses with partners and the whole group.
- ➢ Lesson 15: This lesson provides examples of rational and irrational numbers using terminating and repeating decimals.
- ➢ If time permits, complete the “Are You Ready for More?” for Activity 13.3.

Assessment Suggestions:

- ➢ Lesson 11 cool-down
- ➢ Lesson 12 practice problems

Synthesize and Apply

- When I have a cube root, I can reason about which two whole numbers it is between.
- I understand the meaning of expressions like $\sqrt[3]{5}$
- I understand that every number has a decimal expansion.

Activity Suggestions:

- ➢ Activity 13.2
- ➢ Activity 14.4
- ➢ Lesson 15 cool-down
- ➢ Teach and encourage students to study and annotate the lesson summaries (at the end of every lesson) and refer back to them.
- ➢ If time allows, complete Lesson 16

Assessment Suggestions:

- ➢ End-of-Unit Assessment
- ➢ Lesson 14 practice problems
- ➢ Lesson 15 practice problems
- ➢ revisions to previous assessment prompts
- ➢ Students use learning targets to decide what additional practice they need.

Ongoing Practice

- Assign one or more of the distributed practice problem sets from Lessons 12–16 to be completed over the time period that the section is being worked on.
- These could also be lagging, so that students are working on practice problems from the previous section or unit during this section or unit.
- Specify which problems students should submit, or let them choose.

Anytime Resources

- Delve into one of the culminating lessons from units 6 or 7
- Look for cubes used as everyday items and discuss with someone at home the relationship between the volume and side length.