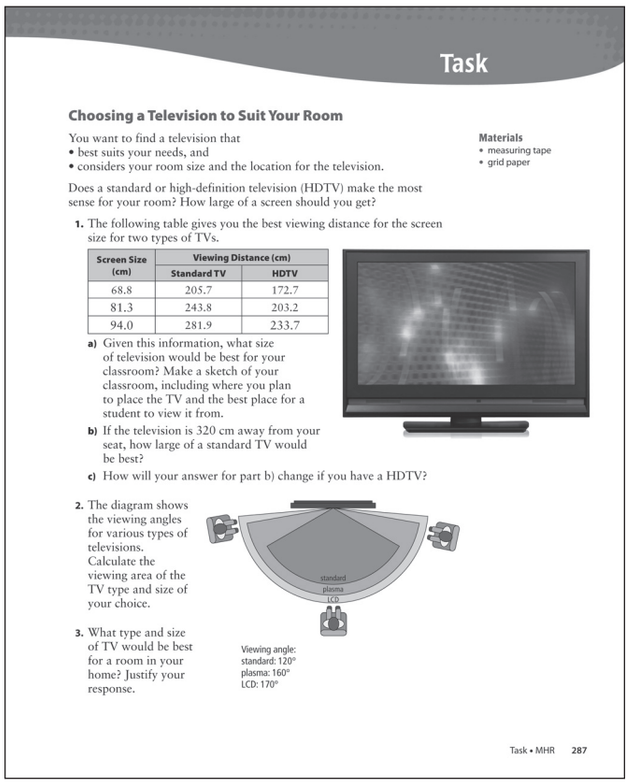
Task



Task

Choosing a Television to Suit Your Room

You want to find a television that
- best suits your needs, and
- considers your room size and the location for the television.

Materials
- measuring tape
- grid paper

Does a standard or high-definition television (HDTV) make the most sense for your room? How large of a screen should you get?

1. The following table gives you the best viewing distance for the screen size for two types of TVs.

Screen Size (cm)	Viewing Distance (cm)	
	Standard TV	HDTV
68.8	205.7	172.7
81.3	243.8	203.2
94.0	281.9	233.7

a) Given this information, what size of television would be best for your classroom? Make a sketch of your classroom, including where you plan to place the TV and the best place for a student to view it from.

b) If the television is 320 cm away from your seat, how large of a standard TV would be best?

c) How will your answer for part b) change if you have a HDTV?

2. The diagram shows the viewing angles for various types of televisions. Calculate the viewing area of the TV type and size of your choice.

3. What type and size of TV would be best for a room in your home? Justify your response.

standard
plasma
LCD

Viewing angle:
standard: 120°
plasma: 160°
LCD: 170°

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Planning Notes

You may wish to use the following steps to introduce and complete this task:

1. Have a class discussion about how listening and viewing experiences depend on three factors:
- viewing distance
- screen size
- screen resolution

During your discussion, ask the following:
- How does the placement of the speakers affect the listening experience?
- How does the placement of the television affect the viewing experience?
- Is there a "sweet spot" in the room, where the sound is the best? where the image is the best?
- Does the source of the music/visuals (e.g., CD, MP3, traditional radio, satellite radio, screen resolution) affect the sound/image?
- Why do some of these sources sound better than others?
- Why do some appear better than others?
- Where do you like to sit when listening to a stereo? watching television?

***MathLinks 9*, page 287**

Suggested Timing
40–50 minutes

Materials
- measuring tape
- grid paper
- protractor
- television or computer monitor (optional)

Blackline Masters
Master 1 Project Rubric
Master 8 Centimetre Grid Paper
Master 9 0.5 Centimetre Grid Paper

Mathematical Processes
- ☑ Communication
- ☑ Connections
- ☑ Mental Mathematics and Estimation
- ☑ Problem Solving
- ☑ Reasoning
- ☐ Technology
- ☑ Visualization

Specific Outcomes
SS4 Draw and interpret scale diagrams of 2-D shapes.
PR2 Graph linear relations, analyze the graph and interpolate or extrapolate to solve problems.
PR3 Model and solve problems using linear equations of the form:
- $ax = b$
- $\frac{x}{a} = b, a \neq 0$
- $ax + b = c$
- $\frac{x}{a} + b = c, a \neq 0$
- $ax = b + cx$
- $a(x + b) = c$
- $ax + b = cx + d$
- $a(bx + c) = d(ex + f)$
- $\frac{a}{x} = b, x \neq 0$

where a, b, c, d, e and f are rational numbers.

2. Ask students to compare the experience of watching television and attending a movie theatre.
- How are they different and why?
- What makes the screen size suitable to the theatre, but not for a house?
- Where do you prefer to sit in the theatre? Why?
- Would you sit in the front row, at the outside edge, if you had a choice? Why or why not?

3. Read the task with the class. Ask:
- What strategies can you use to answer #1?
- How can you use your knowledge of linear relations?
- What other methods might you use?

- Look at the picture of the viewing angle. What circle properties can you identify in this visual? (The centre of the screen is the centre of a circle. The viewing angle is the central angle. The viewing distance is the radius of the circle.)
- How can you use your knowledge of circles to answer #2?
- What strategies can you use to answer #3?
- Why do you think that viewing angle and viewing distance is important to manufacturers? (Manufacturers do research and development to heighten the experience for their buyers. They often publish viewing angle specifications that give suggestions as to where people should sit to see images at their best. Once outside the viewing angle, the pictures tend to lose brightness or colour. Note: HDTVs include plasma and LCD televisions.)

4. Clarify that the task is to
- discover and use the linear relationship between screen size and viewing distance
- use grid paper for a scale drawing of the classroom and the position of the television/monitor
- calculate the viewing area of one type and size of television
- evaluate the best type and size of television for a room at home

5. Review **Master 1 Project Rubric** with students so that they will know what is expected.

Meeting Student Needs

- Students may find it easier to use a table of values to answer #1. Discuss with them how to develop a table of values for this question. You may wish to have them check their answer using a linear relation.
- You may wish to coach students through #2, using one type of screen size, and then ask them to do another on their own.
- You may wish to simplify #3 by having students work from the general rule that the screen size of a standard television is $\frac{1}{3}$ the viewing distance and the screen size of an HDTV is $\frac{2}{5}$ the viewing distance. Written as a linear equation, where $y =$ viewing distance and $x =$ screen size, these would be:
  $-\ y = 3x$ for standard television
  $-\ y = 2.5x$ for HDTV

Gifted and Enrichment

- Have students research television makes and models, choose two, and then provide a report on why one of them better suits the size of a room in their home. The report should include an analysis of how much of the room will *not* have good viewing.

Answers

Choosing a Television to Suit Your Room

Answers may vary depending on the choices students make and what strategies they use.

1. b) 106.7 cm

c) HDTVs can generally be viewed closer than standard TVs. Using a table of values, a television with a screen size of 132.1 cm has a viewing distance of 325.2 cm. Using equivalent ratios, the screen size for 320 cm would be 128.7 cm.

2. Example: For a standard TV with a 68.8-cm screen size and viewing distance of 205.7 cm:

$$\text{Area of circle} = \pi r^2$$
$$= \pi(205.7)^2$$
$$\approx 132\,861.21 \text{ cm}^2$$

$3(68.8) = 206.4$
$\pi(206.4)^2 \approx 1337670.01$
$1337670.01 \div 3 = 44589.01$ or 4.4 m^2

$$\text{Fraction of circle covered by viewing angle} = \frac{120}{360}$$
$$= \frac{1}{3}$$

$$\text{Viewing area of television} = 132\,861.21 \div 3$$
$$= 44\,287.07 \text{ cm}^2$$

The viewing area of a 68.8-cm standard TV is $44\,287.07 \text{ cm}^2$ or 4.4 m^2.

Assessment	Supporting Learning
Assessment *of* Learning	
Choosing a Television to Suit Your Room Introduce the task to students. Have students provide individual responses.	• Provide students with grid paper. You may wish to hand out copies of **Master 8 Centimetre Grid Paper** and **Master 9 0.5 Centimetre Grid Paper**. • **Master 1 Project Rubric** provides a holistic descriptor that will assist you in assessing student work on this task. Page 394 provides notes on how to use this rubric for the task. • To view student exemplars, go to www.mathlinks9.ca, access the Teacher Centre on the Online Learning Centre, go to Assessment, and then follow the links. • For a second task, complete with teaching notes and student exemplars, go to www.mathlinks9.ca, access the Teacher Centre on the Online Learning Centre, go to Assessment, and then follow the links.

The chart below shows the **Master 1 Project Rubric** for tasks such as this and provides notes that specify how to identify the level of specific answers for this task.

Score/Level	Holistic Descriptor	Specific Question Notes
5 **(Standard of Excellence)**	❑ Applies/develops **thorough** strategies and mathematical processes making **significant** comparisons/connections that demonstrate a **comprehensive** understanding of how to develop a complete solution ❑ Procedures are **efficient and effective** and may contain a **minor mathematical error** that does not affect understanding ❑ Uses **significant** mathematical language to explain their understanding and provides **in-depth** support for their conclusion	• provides a complete and correct solution Note: A minor calculation error may exist. If it does not hinder the understanding of the problem or affect the final answer, the paper remains at 5.
4 **(Above Acceptable)**	❑ Applies/develops **thorough** strategies and mathematical processes for making **reasonable** comparisons/connections that demonstrate a **clear** understanding ❑ Procedures are **reasonable** and may contain a **minor mathematical error** that may hinder the understanding in one part of a complete solution ❑ Uses **appropriate** mathematical language to explain their understanding and provides **clear** support for their conclusion	Demonstrates one of the following: • provides a complete response to all parts of the activity, with weak justification. • provides a complete response to the activity, with minor calculation or interpretation errors
3 **(Meets Acceptable)**	❑ Applies/develops **relevant** strategies and mathematical processes making **some** comparisons/connections that demonstrate a **basic** understanding ❑ Procedures are **basic** and may contain a **major error or omission** ❑ Uses **common** language to explain their understanding and provides **minimal** support for their conclusion	Demonstrates one of the following: • provides correct and complete responses to #1a) and b), with correct initial starts to two other parts in #1 or 2 • provides a complete and correct #2 with a correct part in #1 • provides correct #1b) and d) for incorrect #1a) and c); provides a start to #2
2 **(Below Acceptable)**	❑ Applies/develops **some relevant** mathematical processes making **minimal** comparisons/connections that lead to a **partial solution** ❑ Procedures are **basic** and may contain **several major mathematical errors** ❑ Communication is **weak**	Demonstrates one of the following: • provides any two correct and complete parts of #1 • provides a correct #2
1 **(Beginning)**	❑ Applies/develops an **initial start** that may be **partially correct** or could have led to a correct solution ❑ Communication is **weak or absent**	• provides a correct start to any part of the activity