## Circles

### Overall Expectations

Students will:
- Determine the relationships among units and measurable attributes, including the area of a circle and the volume of a cylinder (8m31)
- Demonstrate an understanding of the geometric properties of quadrilaterals and circles and the applications of geometric properties in the real world (8m40)

### Specific Expectations

Students will:
- Solve problems that require conversions involving metric units of area, volume, and capacity (i.e., square centimetres and square metres; cubic centimetres and cubic metres; millilitres and cubic centimetres) (8m33)
- Measure the circumference, radius, and diameter of circular objects, using concrete materials (8m34)
- Determine, through investigation using a variety of tools and strategies, the relationships for calculating the circumference and the area of a circle, and generalize to develop the formulas
  [i.e., Circumference of a circle = π x diameter; Area of a circle = π x (radius)$^2$] (8m35)
- Solve problems involving the estimation and calculation of the circumference and the area of a circle (8m36)
- Construct a circle, given its centre and radius, or its centre and a point on the circle, or three points on the circle (8m44)

| Lesson | Learning Focus | Specific Expectations |
|---|---|---|
| Circles | • Estimate and measure the circumference, radius, and diameter of circular objects using a variety of concrete tools (e.g., string, tape measure) | 8m34 |
| Circumference | • Through investigation determine the relationship for calculating the circumference of a circle (i.e. measure diameter and circumference and investigate the ratio of circumference to diameter (C:d = π :1)<br> o use a variety of tools (e.g. cans and string, dynamic geometry software) and strategies<br>• Generalize to develop the formula Circumference= π x diameter | 8m35 |
| Circumference Problems | • Solve problems involving the estimation and calculation of circumference using real-life contexts<br> o include problems where circumference is given and diameter or radius is required | 8m36 |
| Area of a Circle | • Through investigation determine the relationship for calculating the area of a circle<br> o Use a variety of tools (e.g., cans and string, dynamic geometry software) and strategies (e.g., paper cutting, grid overlays<br>• Generalize to develop the formula Area = π x radius$^2$ | 8m35 |

## Circles (continued)

| Lesson | Learning Focus | Specific Expectations |
|---|---|---|
| Area of a Circle Problems | • Solve problems involving the estimation and calculation of area<br>• Solve area problems requiring conversions between square units<br>• Solve problems where area is given and radius or diameter is required | 8m33<br>8m36 |
| Circumference versus Area Problems | • Solve problems involving the estimation and calculation of circumference and area within contexts<br>  o these contexts should require determining whether area or circumference is needed<br>• Solve circumference and area problems involving real-life contexts that require conversions between metric units<br>• Solve problems involving real-life contexts where area or circumference is given and radius or diameter is required | 8m33<br>8m36 |
| Construct Circles | • Construct a circle given its centre and radius<br>• Construct a circle from its centre and a point on the circle<br>• Construct a circle from three points on the circle | 8m44 |
| Consolidation and Summative Tasks | | |

## Circles

Specific Expectations: 8m34

| | Learning Focus | Blended Learning | Other Resources |
|---|---|---|---|
| | | **Teacher Guide**<br>Unit 2 Activity 1: Circles Introduction<br>OERB ID: ELO1477250 | TIPS4RM Grade 8 Unit 3: From Powers to Circles<br>• Day 5: Talking About Circles |
| **Minds On** | • Identify parts of a circle<br>  o radius<br>  o diameter<br>  o circumference | Unit 2 Activity 1: Minds On<br>OERB ID: ELO1476960<br>• Circles<br>  o explore connections between radius, diameter, circumference and area<br>• Journal entry | |
| **Action** | • Estimate and measure the circumference, radius, and diameter of circular objects using a variety of concrete tools (e.g., string, tape measure) | Unit 2 Activity 1: Action<br>• Pi, Please, with a Side of Baseball<br>  OERB ID: ELO1416660<br>  o circumference and diameter relationship<br><br>Unit 2 Activity 1: Consolidation<br>• Circle Relationships Activity<br>  o hands on exploration<br>  o journal | |
| **Consolidation** | | Unit 2 Activity 1: Action<br>• Assignment 1: Parts of a Circle<br>  o explaining relationships between radius and diameter, diameter and circumference<br>  o real-life connection<br>• Anchor Chart – circumference and area of circle | |

# Circumference

Specific Expectations: 8m35

| | Learning Focus | Blended Learning | Other Resources |
|---|---|---|---|
| | | **Teacher Guide**<br>Unit 2: Measurement<br>OERB ID: ELO1477250<br>• Unit 2: Activity 1: Circles Introduction<br>• Unit 2 Activity 2: Circles – Circumference and Area | TIPS4RM Grade 8 Unit 3: From Powers to Circles<br>• Day 6: Mysterious Circles<br><br>Homework Help<br>• Circles: Finding the Circumference Given the Diameter<br><br>Gizmos<br>• Circumference and Area of Circles<br><br>Geometer's Sketchpad<br>• Bike Wheel<br>• Circles and Pi<br><br>GeoGebra<br>• Rolling a Circle to Find Pi<br><br>Desmos<br>• Measuring Circles<br><br>Gap Closing I/S Student Book: 2D Measurement pp 3 – 6, 21 – 27<br><br>Gap Closing I/S Facilitator's Guide: 2D Measurement pp 4 – 6, 23 – 29 |
| **Minds On** | • Develop familiarity with dynamic tools for creating circles and measuring their diameter and circumference | Unit 2 Activity 2: Minds On<br>OERB ID: ELO1476970<br>• Review<br>  o parts of a circle<br>  o circumference<br>• Discussion<br>  o translate into words and explain why it is appropriate: $C = \pi \times d$ | |
| **Action** | • Through investigation determine the relationship for calculating the circumference of a circle (i.e. measure diameter and circumference and investigate the ratio of circumference to diameter ($\pi$))<br>  o use a variety of tools (e.g. cans and string, dynamic geometry software) and strategies<br>• Generalize to develop the formula Circumference= $\pi$ x diameter | Unit 2 Activity 1: Action<br>• Pi, Please, with a Side of Baseball<br>OERB ID: ELO1416660<br>  o circumference and diameter relationship<br><br>*Note: supplementation required for developing familiarity with dynamic tools for creating circles and measuring their diameter and circumference* | |
| **Consolidation** | | | |

## Circumference Problems

Specific Expectations: 8m36

| | Learning Focus | Blended Learning | Other Resources |
|---|---|---|---|
| **Minds On** | • Review circumference formula and how to determine the circumference for a given diameter or radius | | TIPS4RM Grade 8 Unit 3: From Powers to Circles<br>• Day 6: Mysterious Circles |
| **Action** | • Solve problems involving the estimation and calculation of circumference using real-life contexts<br>  o include problems where circumference is given and diameter or radius is required | | Gap Closing I/S Student Book: 2D Measurement<br>pp 3 – 6, 21 – 27<br><br>Gap Closing I/S Facilitator's Guide: 2D Measurement<br>pp 4 – 6, 23 – 29 |
| **Consolidation** | | | |

## Area of a Circle

Specific Expectations: 8m35

| | Learning Focus | Blended Learning | Other Resources |
|---|---|---|---|
| | | **Teacher Guide**<br>Unit 2: Activity 2: Circles – Circumference and Area<br>OERB ID: ELO1477250 | TIPS4RM Grade 8 Unit 3: From Powers to Circles<br>• Day 7: Circulating Problems<br>• Day 8: Parts and Wholes<br><br>Homework Help<br>• Circle Measurement |
| **Minds On** | • Develop familiarity with dynamic tools for creating circles and measuring their diameter and area | | |
| **Action** | • Through investigation determine the relationship for calculating the area of a circle<br>• Use a variety of tools (e.g., cans and string, dynamic geometry software) and strategies (e.g., paper cutting, grid overlays<br>• Generalize to develop the formula Area = π x radius$^2$ | Unit 2 Activity 2: Action<br>OERB ID: ELO1476970<br>• Toss Me a Circle<br>  OERB ID: ELO1413950<br>  o discover and determine area of a circle<br>• Circus Circus<br>  OERB ID: ELO1413960<br>  o multiple choice questions about radius, diameter, circumference and area<br>• Discussion<br>  o write a problem about calculating area and circumference<br>• Anchor Chart<br>  o add new area and circumference information | Gizmos<br>• Circumference and Area of Circles<br><br>Geometer's Sketchpad<br>• Circles and Pi<br><br>GeoGebra<br>• Explore the Area of a Circle<br>• Area of a Circle<br><br>NCTM Illuminations<br>• Circle Tool |
| **Consolidation** | | Unit 2 Activity 2: Consolidation<br>• Assignment 1: Toilet Paper Roll Challenge – Part 1<br>  o circumference, perimeter and area questions | Gap Closing I/S Student Book: 2D Measurement<br>pp 3 – 6, 21 – 27<br><br>Gap Closing I/S Facilitator's Guide: 2D Measurement<br>pp 4 – 6, 23 – 29 |

## Area of Circles Problems

| Specific Expectations: 8m33, 8m36 | | |
|---|---|---|
| **Learning Focus** | **Blended Learning** | **Other Resources** |
| **Minds On** • Review Area formula and how to determine the area for a given diameter or radius | | TIPS4RM Grade 8 Unit 3: From Powers to Circles • Day 8: Parts and Wholes • Day 9: Unusual Dart Board • Day 10: Composition with Circles |
| **Action** • Solve problems involving the estimation and calculation of area • Solve area problems requiring conversions between square units • Solve problems where area is given and radius or diameter is required | | Geometer's Sketchpad • Composite Shapes  Geogebra • Explore the Area of a Circle • Area of a Circle |
| **Consolidation** | | NCTM Illuminations • Circle Tool  Gap Closing I/S Student Book: 2D Measurement pp 3 – 6, 21 – 27  Gap Closing I/S Facilitator's Guide: 2D Measurement pp 4 – 6, 23 – 29 |

## Circumference versus Area Problems

Specific Expectations: 8m33, 8m36

| | **Learning Focus** | **Blended Learning** | **Other Resources** |
|---|---|---|---|
| **Minds On** | • Review circumference and area formulas<br>• Identify contexts that relate to circumference<br>• Identify contexts that relate to area | | Homework Help<br>• [Circle Measurement Quiz](#) |
| **Action** | • Solve problems involving the estimation and calculation of circumference and area within contexts<br>  o these contexts should require determining whether area or circumference is needed<br>• Solve circumference and area problems involving real-life contexts that require conversions between metric units<br>• Solve problems involving real-life contexts where area or circumference is given and radius or diameter is required | | |
| **Consolidation** | | | |

## Construct Circles

Specific Expectations: 8m44

| | Learning Focus | Blended Learning | Other Resources |
|---|---|---|---|
| **Minds On** | • Practise using compasses to create circles and to draw perpendicular bisectors of line segments | | |
| **Action** | • Construct a circle given its centre and radius<br>• Construct a circle from its centre and a point on the circle<br>• Construct a circle from three points on the circle | | |
| **Consolidation** | | | |

## Consolidation and Summative Tasks

Specific Expectations: 8m33, 8m34, 8m35, 8m36, 8m44

| Blended Learning | Other Resources |
|---|---|
| | |

| Resource | URL |
|---|---|
| Teacher Guide:<br>Unit 2 Activity 1: Circles Introduction | https://download.elearningontario.ca/repository/14/1477250000/GRD8MTHEU06A03/content.html |
| Unit 2 Activity 1: Minds On | https://download.elearningontario.ca/repository/14/1476960000/GRD8MTHEU02A01/content.html |
| Pi, Please, with a Side of Baseball | https://download.elearningontario.ca/repository/14/1416660000/LO1129.html |
| Unit 2 Activity 1: Consolidation | https://download.elearningontario.ca/repository/14/1476960000/GRD8MTHEU02A01/content_3.html |
| Unit 2 Activity 1: Action | https://download.elearningontario.ca/repository/14/1476960000/GRD8MTHEU02A01/content_2.html |
| Assignment 1: Parts of a Circle | https://download.elearningontario.ca/repository/14/1476960000/GRD8MTHEU02A01/assignment.html |
| TIPS4RM Grade 8 Unit 3: From Powers to Circles | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/TIPS4RM/Grade8English/Unit3_FromPowersToCircles.pdf |

# Circumference

| Resource | URL |
|---|---|
| Teacher Guide:<br>Unit 2: Activity 1: Circle Introduction | https://download.elearningontario.ca/repository/14/1477250000/GRD8MTHEU06A03/content.html |
| Teacher Guide:<br>Unit 2 Activity 2: Circles – Circumference and Area | https://download.elearningontario.ca/repository/14/1477250000/GRD8MTHEU06A03/content_2.html |
| Unit 2 Activity 2: Minds On | https://download.elearningontario.ca/repository/14/1476970000/GRD8MTHEU02A02/content.html |
| Pi, Please, with a Side of Baseball | https://download.elearningontario.ca/repository/14/1416660000/LO1129.html |
| TIPS4RM Grade 8 Unit 3: From Powers to Circles | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/TIPS4RM/Grade8English/Unit3_FromPowersToCircles.pdf |
| Homework Help:<br>Circles: Finding the Circumference Given the Diameter | https://homeworkhelp.ilc.org/chat/chat.php?config=playback&question_id=258634&type=bs#/question/258634/type/bs |
| Gizmos:<br>Circumference and Area of Circles | https://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=206 |
| Geometer's Sketchpad:<br>Bike Wheel | http://sketchexchange.keypress.com/sketch/view/710/bike-wheel |
| Geometer's Sketchpad:<br>Circles and Pi | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GSP/AreaAndPermieter/CircumferenceAreaCircle_CirclePi.gsp |
| GeoGebra:<br>Rolling a Circle to Find Pi | http://tube.geogebra.org/material/simple/id/14301 |
| Desmos:<br>Measuring Circles | https://teacher.desmos.com/activitybuilder/custom/560184eefccd7717065ed736 |
| Gap Closing I/S Student Book:<br>2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2Dmeasurement_SB_IS.pdf |
| Gap Closing I/S Facilitator's Guide:<br>2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2DMeasurement_FG_IS.pdf |

| Resource | URL |
|---|---|
| TIPS4RM Grade 8 Unit 3: From Powers to Circles | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/TIPS4RM/Grade8English/Unit3_FromPowersToCircles.pdf |
| Gap Closing I/S Student Book: 2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2Dmeasurement_SB_IS.pdf |
| Gap Closing I/S Facilitator's Guide: 2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2DMeasurement_FG_IS.pdf |

| Resource | URL |
|---|---|
| Teacher Guide:<br>Unit 2: Activity 2:<br>Circles – Circumference and Area | https://download.elearningontario.ca/repository/14/1477250000/GRD8MTHEU06A03/content_2.html |
| Toss Me a Circle | https://download.elearningontario.ca/repository/14/1413950000/LO1130.html |
| Circus Circus | https://download.elearningontario.ca/repository/14/1413960000/LO1156.html |
| Unit 2 Activity 2: Action | https://download.elearningontario.ca/repository/14/1476970000/GRD8MTHEU02A02/content_2.html |
| Assignment 1:<br>Toilet Paper Roll Challenge –  Part 1 | https://download.elearningontario.ca/repository/14/1476970000/GRD8MTHEU02A02/assignment.html |
| TIPS4RM Grade 8 Unit 3:<br>From Powers to Circles | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/TIPS4RM/Grade8English/Unit3_FromPowersToCircles.pdf |
| Homework Help:<br>Circle Measurement | https://homeworkhelp.ilc.org/tools/listen_learn/details.php?t_id=322 |
| Gizmos:<br>Circumference and Area of Circles | https://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=206 |
| Geometer's Sketchpad :<br>Circles and Pi | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GSP/AreaAndPermieter/CircumferenceAreaCircle_CirclePi.gsp |
| GeoGebra:<br>Explore the Area of a Circle | http://tube.geogebra.org/material/simple/id/28109 |
| GeoGebra:<br>Area of a Circle | http://tube.geogebra.org/material/simple/id/537035 |
| NCTM Illuminations :<br>Circle Tool | http://illuminations.nctm.org/Activity.aspx?id=3547 |
| Gap Closing I/S Student Book:<br>2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2Dmeasurement_SB_IS.pdf |
| Gap Closing I/S Facilitator's Guide:<br>2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2DMeasurement_FG_IS.pdf |

## Area of Circles Problems

| Resource | URL |
|---|---|
| TIPS4RM Grade 8 Unit 3: From Powers to Circles | http://www.edugains.ca/resources/LearningMaterials/TIPS/tips4rm/grade8/Unit3_From-PowersToCircles.pdf |
| Geometer's Sketchpad : Composite Shapes | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GSP/AreaAndPermieter/CompositeShapes.gsp |
| Geogebra: Explore the Area of a Circle | http://tube.geogebra.org/material/simple/id/28109 |
| Geogebra: Area of a Circle | http://tube.geogebra.org/material/simple/id/537035 |
| NCTM Illuminations: Circle Tool | http://illuminations.nctm.org/Activity.aspx?id=3547 |
| Gap Closing I/S Student Book: 2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2Dmeasurement_SB_IS.pdf |
| Gap Closing I/S Facilitator's Guide: 2D Measurement | http://www.edugains.ca/resourcesMath/CE/LessonsSupports/GapClosing/NumberSense_Int-Senior/8-2DMeasurement_FG_IS.pdf |

## Circumference versus Area Problems

| Resource | URL |
|---|---|
| Homework Help: Circle Measurement Quiz | https://homeworkhelp.ilc.org/tools/listen_learn/quiz.php?t_id=322 |