

Overview

College Technology plays an important role in many activities, such as science, business, engineering, and computer studies; the hospitality, recreation, and tourism industries; and the technical trades. *McGraw-Hill Ryerson Mathematics for College Technology 12 Study Guide and Exercise Book* is designed for students planning to qualify for college technology and business programs. The Study Guide and Exercise Book is designed to support students in their understanding of the key concepts in the course.

Study Guide and Exercise Book Organization

- Chapter 1 extends concepts of trigonometry by defining trigonometric ratios of angles from 0° to 360° , including identifying special angles. The latter part of the chapter focuses on solving a variety of two-dimensional and three-dimensional problems involving right triangles and oblique triangles. Strategies extend to the sine law (including the ambiguous case) and the cosine law.
- Chapter 2 applies the concepts from Chapter 1 to analyse the graphs of trigonometric functions. You will graph the sine and cosine functions and identify their properties, investigate transformations of the sine and cosine functions, and explore mathematical modelling with transformed functions. In the latter part of the chapter, you will collect data representing periodic behaviour and determine equations representing a variety of periodic situations. You will then solve related problems, including those that do not involve angles.
- Chapter 3 introduces the concepts of geometric vectors. Topics include determining the components of vectors, adding vectors, and subtracting vectors. Finally, you will solve problems involving vectors.
- Chapter 4 introduces two new functions and equation types, exponential and logarithmic. After working with the exponential laws, you will solve exponential equations graphically and numerically. Then, you will explore logarithms and their connection to exponential equations. Finally, you will solve problems related to applications connecting logarithms and the physical sciences.
- Chapter 5 introduces polynomial functions and how to recognize their algebraic and graphical representations. You will explore characteristics of polynomial functions, including key features of their graphs and applications to real-world situations. You will also examine factoring of polynomial expressions and the connection between equations and graphs of polynomial functions.
- In Chapter 6, you will combine your skills in equation solving and graphing to solve polynomial equations and verify solutions. Strategies include factoring and the use of rational exponents. Finally, you will examine the connection between functions and formulas, and solve problems arising from real-world applications.
- In the first half of Chapter 7, you will gather and interpret information about real-world applications of two-dimensional and three-dimensional objects. You will also solve problems involving area, surface area, and volume, and convert between imperial and metric systems, as necessary within applications. In the second half of the chapter, you will explore properties of circles and their application to problems arising from real-world situations.

Study Guide and Exercise Book Features

- Each section begins with Key Concepts that summarize the concepts needed to complete the exercises.
- The sections continue with a worked example that guides you through the skills needed to complete the exercises.
- Exercises are organized into sections A (practice), B (connect and apply), and C (extend and challenge).
- Selected questions in each section are marked by a star, which indicates that full worked solutions are provided at the back of the book. Answers to all other questions are also provided.
- Each chapter ends with a checklist of what you should be able to do by the end of the chapter.
- A practice exam at the end of the Study Guide and Exercise Book gives you the opportunity to determine if you are ready for the final examination.

Formulas

ALGEBRA

Factoring Special Polynomials	$x^2 \pm 2xy + y^2 = (x \pm y)^2$ $x^3 \pm y^3 = (x \pm y)(x^2 \pm xy + y^2)$	$x^2 - y^2 = (x - y)(x + y)$
Quadratic Formula	If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.	

Rules for Exponents

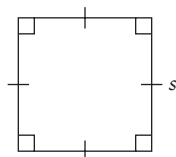
Product	$(x^a)(x^b) = x^{a+b}$	Power of a Product	$(xy)^a = x^a y^a$
Quotient	$\frac{x^a}{x^b} = x^{a-b}$	Power of a Quotient	$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$
Power	$(x^a)^b = x^{ab}$	Negative Exponent	$x^{-a} = \frac{1}{x^a}$
Rational Exponent	$x^{\frac{1}{a}} = \sqrt[a]{x}$		

Logarithms $y = \log_a x \Leftrightarrow a^y = x$ $\log_{10} x$ is usually written as $\log x$. $\log_a a = 1$ $\log_a a^x = x$ $a^{\log_a x} = x$	Logarithm Laws $\log_a (xy) = \log_a x + \log_a y$ $\log_a \left(\frac{x}{y}\right) = \log_a x - \log_a y$ $\log_a x^n = n \log_a x$ $a^x = y$ is equivalent to $x = \log_a y$. $\log_a a^n = n$ Change of base: From base b to base a : $\log_b x = \frac{\log_a x}{\log_a b}$ From base a to base 10: $\log_a b = \frac{\log b}{\log a}$
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MEASUREMENT

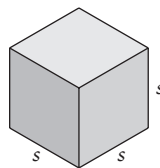
In the following, P represents the perimeter, C the circumference, A the area, V the volume, and SA the surface area.

Square



$$A = s^2$$

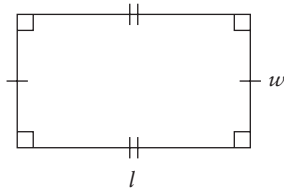
Cube



$$V = s^3$$

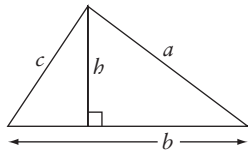
$$SA = 6s^2$$

Rectangle



$$A = lw$$

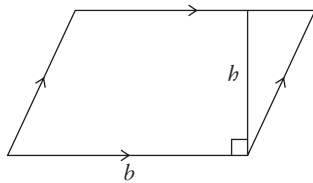
Triangle



$$P = a + b + c$$

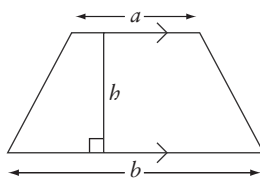
$$A = \frac{1}{2}bh$$

Parallelogram



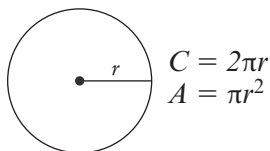
$$A = bh$$

Trapezoid



$$A = \frac{1}{2}(a + b)h$$

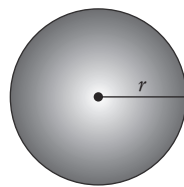
Circle



$$C = 2\pi r$$

$$A = \pi r^2$$

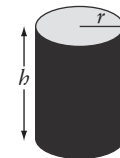
Sphere



$$V = \frac{4}{3}\pi r^3$$

$$SA = 4\pi r^2$$

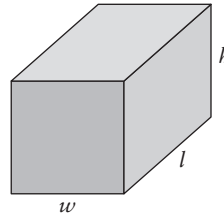
Cylinder



$$V = \pi r^2 h$$

$$SA = 2\pi r h + 2\pi r^2$$

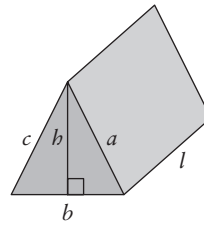
Rectangular Prism



$$V = lhw$$

$$SA = 2lw + 2lh + 2wh$$

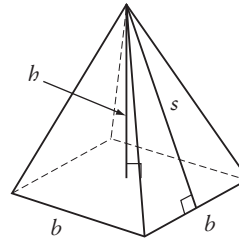
Triangular Prism



$$V = \frac{1}{2}bhl$$

$$SA = bh + al + bl + cl$$

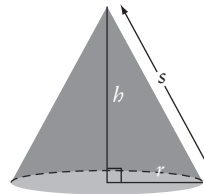
Square-Based Pyramid



$$V = \frac{1}{3}b^2 h$$

$$SA = 2bs + b^2$$

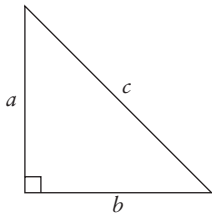
Cone



$$V = \frac{1}{3}\pi r^2 h$$

$$SA = \pi r^2 + \pi r s$$

Pythagorean Theorem

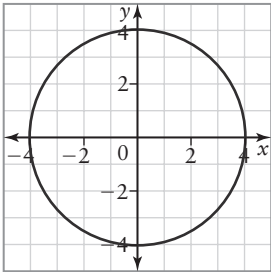
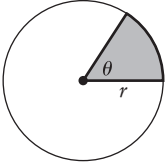
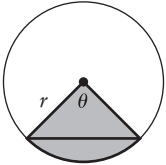
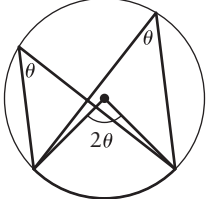
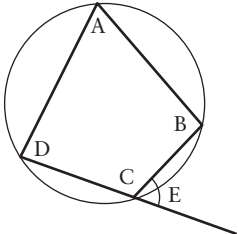


$$c^2 = a^2 + b^2$$

TRIGONOMETRY

<p>Primary Trigonometric Ratios</p>	$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$
	$\sin \theta = \frac{y}{r} \qquad \cos \theta = \frac{x}{r} \qquad \tan \theta = \frac{y}{x}$
<p>Sine Law</p>	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
<p>Cosine Law</p>	$a^2 = b^2 + c^2 - 2bc \cos A$ $b^2 = a^2 + c^2 - 2ac \cos B$ $c^2 = a^2 + b^2 - 2ab \cos C$

CIRCLE GEOMETRY

<p>Equation of a Circle</p> 	<p>Equation: $x^2 + y^2 = r^2$ Example: For a circle with centre (0, 0) and radius 4. $x^2 + y^2 = 16$</p>
<p>Arc Length and Area of a Sector</p> 	<p>Arc length = $\frac{\theta}{360^\circ} \times 2\pi r$</p> <p>Area of a sector = $\frac{\theta}{360^\circ} \times \pi r^2$</p>
<p>Area of a Segment</p> 	<p>Area of a segment = $\frac{1}{2}r^2\left(\frac{\pi}{180^\circ}\theta - \sin \theta\right)$</p>
<p>Central Angle</p> 	<p>The central angle is twice the inscribed angle θ subtended by the same arc. Central angle = 2θ</p>
<p>Cyclic Quadrilateral</p> 	<p>The sum of opposite angles is 180°. $\angle A + \angle C = 180^\circ$ $\angle B + \angle D = 180^\circ$</p> <p>An exterior angle is equal to the opposite interior angle. $\angle A = \angle E$</p>

