



Study Guide

For Placement into Grade 10C (MATH 180)



Important Information

The Math Placement test is a free assessment designed for Academic Upgrading placement purposes only. No section of the test may be used for admission to any SAIT program other than Academic Upgrading. The Math Placement Test is not accepted for admission to any other institution.

- The passing mark required for eligibility to register in Math-180 (Math 10C) is 60%.
- We aim to put students' passing marks on our system within 2 business days of successful completion of the test.
- Students who have been accepted into the Academic Upgrading program can register for the course they are placed into once we have granted them permission based on their passing grades.
- Students who have already taken and passed SAIT's Academic Upgrading courses in Math and Physics ARE NOT required to take a placement test.

Math Placement Study Guide

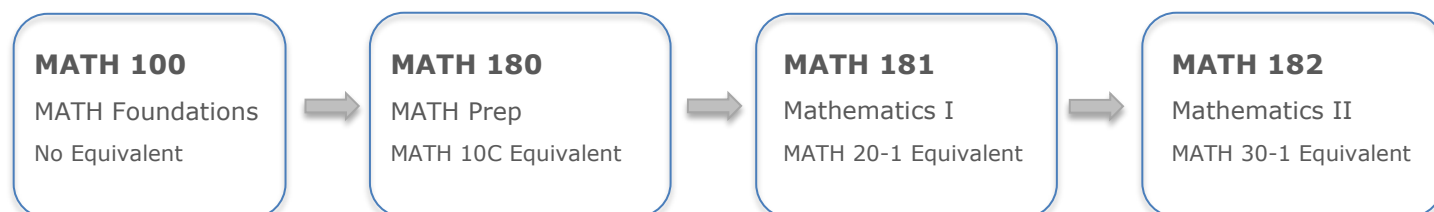
This study guide is designed to prepare students for the Academic Upgrading Math Placement test for entry into Math-180 (Math 10C). Please use the following grade 9 practice exercises to prepare for your online placement test to meet eligibility for Math 10C. An answer key is included at the end of this guide.

This test is for placement into grade Math 10C equivalency (Math 180):

- The study guide consists of 49 questions for practice. The actual test will consist of 22 questions.
- **Calculators are not permitted for this test.** You will be provided with a formula sheet, which is also provided in this guide.
- Students should allow for 60 minutes to complete the test. An additional 30 minutes has been added to allow for accommodated time, for a total test time of 90 minutes.
- A passing mark of 60% or greater is required in this test for eligibility to register in Math 180.
- This test is to be written in the Testing Centre.



SAIT Academic Upgrading Course Sequence



Note: MATH 100 is not transferable outside of SAIT. MATH 180, MATH 181, and MATH 182 are accepted as admission requirements at other post-secondary institutions in Alberta, but you should always check with the post-secondary institution you are interested in attending (if it is not SAIT) to confirm it will accept the courses.

Note: SAIT also offers MATH 162 (Mathematics 30-2 equivalent) as an evening online course only. This course is acceptable for admission at SAIT and other colleges and polytechnics across Alberta, but not necessarily degree-granting institutions (refer to www.acat.gov.ab.ca for more information). Please talk to an upgrading advisor for more information.

Please review your future program's math admission requirements on SAIT.ca to determine which math stream is most suitable for your needs.

For more details about these courses or the required testing scores to place into them, contact upgrading@sait.ca or 403-210-5756.

Grade 9 Material: Mathematics Exercises

These will be similar to what you will be tested for placement into Math 10C equivalency (Math 180). All questions are to be completed without a calculator.

1) Find all the factors of the following:

a) 36

b) 30

c) 48

2) Solve the following and express your answer in both improper and mixed fraction formats:

a) $4 + \frac{3}{5}$

b) $1 + \frac{2}{5}$

c) $2 + \frac{3}{4}$

3) Solve the following and express your answer in reduced form:

a) $\frac{4}{5} - \frac{3}{8}$

b) $\frac{3}{2} - \frac{2}{5}$

c) $\frac{5}{3} - \frac{4}{5}$

4) Solve the following and put into reduced (simplest) form:

a) $\frac{4}{7} \times \frac{3}{5}$

b) $\frac{1}{3} \times \frac{3}{7}$

c) $\frac{4}{5} \times \frac{5}{8}$

5) Solve the following and put into reduced (simplest) form:

a) $\frac{3}{11} \div \frac{1}{3}$

b) $\frac{2}{7} \div \frac{4}{3}$

c) $\frac{3}{2} \div \frac{3}{4}$

6) Express as a decimal:

a) $\frac{3}{8}$

b) $\frac{3}{5}$

c) $\frac{2}{9}$

7) What is

a) 30% of \$55?

b) 25% of \$64?

c) 15% of \$22?

- 8) Alice buys a cake with a price tag of \$17. If the GST (federal sales tax) is 5%, what is the total price of the cake?
- 9) Jill buys a shirt with a price tag of \$32. If the GST (federal sales tax) is 8%, what is the total cost of Jillian's shirt?
- 10) Brad buys a pair of shoes with a price tag of \$85. If the GST (federal sales tax) is 3%, what is the total cost of his shoes?
- 11) Simplify the following expressions using exponential notation:

a) $A \times A \times A$

b) $b \times b \times b \times b$

c) $k \times k \times k \times k \times k \times k$

- 12) Place the following numbers in correct order from GREATEST to SMALLEST:

a) $-2/3, 3/4, 0.7, -0.545454, 2/5$

b) $3/5, -0.11111, 7/3, -2/3, 0.99$

- 13) Place the following numbers in correct order from SMALLEST to GREATEST:

a) $5/4, -0.2222, 1/2, -5/10, 0.585858$

b) $9/8, 0.141414, -2.0022, 1/6, -1/3$

- 14) Evaluate the following:

a) $30 - 3(12 + 6 \div 3) \times 5$

b) $8 + 2(20 - 4 \times 3) \div 2$

c) $7 + 2(15 - 3 \times 3) \div 4$

- 15) Solve the following equations for x:

a) $3x - 6 = 18$

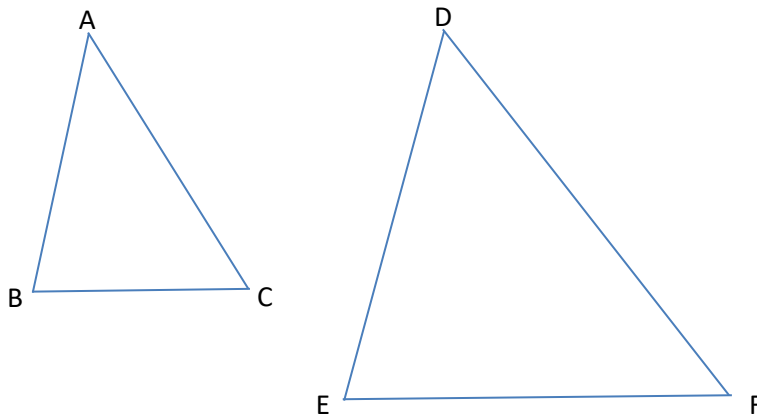
b) $5x + 2 = 27$

c) $3x + 1 = 19$

- 16) A 5 metre-long ladder is leaned up against a wall. If the ladder reaches 3 m up the wall, how many metres is the base of the ladder from the wall?
- 17) A yard is 12 m long and 5 m wide. If you walked diagonally across the lawn (from one corner across the lawn to the other corner), how far did you walk?
- 18) A room is 6 m long and 8 m wide. If you walked diagonally across the room (from one corner across the room to the other corner), how far did you walk?
- 19) A large desk is 130 cm long and 60 cm wide. A piece of square note paper is 10 cm long and 10 cm wide. How many pieces of note paper (side-by-side) can fit on the desk?
- 20) A floor is 5 m long and 6 m wide. The floor is to be filled in with square tiles that are each 0.5 m long and 0.5 m wide. How many tiles will it take to cover the entire floor?
- 21) A large floor is 15 m long and 25 m wide. The floor is to be filled in with square tiles that are each 1.0 m long and 1.0 m wide. How many tiles will it take to cover the entire floor?

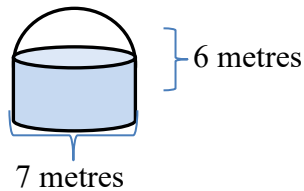
- 22) A soup can has a diameter of 5 cm and a height of 11 cm. Write an expression in terms of π that could be used to find the volume of the can.
- 23) A large cylindrical can of juice has a radius of 10 cm and a height of 18 cm. What is the volume of the can?
- 24) An oil drum has a radius of 50 cm and a height of 120 cm. What is the volume of the drum?

Use the following diagram of **similar** triangles to answer #25-27 below. Note that the diagrams below are not drawn to scale.



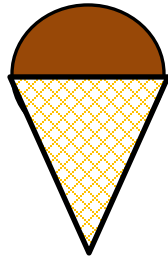
- 25) AC is 3 cm and DF is 10 cm. If DE is 8 cm, how long is AB ? Answer to the nearest 10^{th} cm.
- 26) AB is 4 mm, and DE is 8 mm. If EF is 7 mm, how long is BC ? Express your answer as a reduced fraction.
- 27) BC is 3 m, and EF is 6 m. If DF is 8 m, how long is AC ?
- 28) A 50 m tall building casts a shadow 20 m long. At the same time, a pole casts a shadow that is 4 m long. How tall is the pole?
- 29) A building casts a shadow of length 12 m. At the same time, a 2 m post casts a 6 m shadow. How tall is the building?
- 30) A building casts a shadow of length 20 m. At the same time, a 8 m tree casts a shadow 3 m long. How tall is the building?

- 31) A grain storage unit has the shape of a cylinder with a hemisphere on top as seen in the diagram below. The diameter of the base is 7 metres, and the height of the cylindrical part is 6 metres.



Write an expression in terms of π that could be used to find the volume of the grain storage unit.

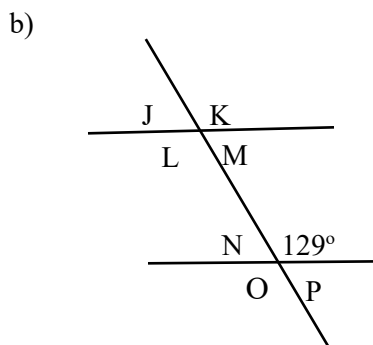
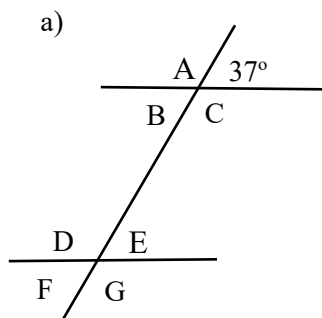
- 32) An ice cream cone is topped with one hemispherical scoop of chocolate ice cream as shown below. Note that the diagram is not drawn to scale.



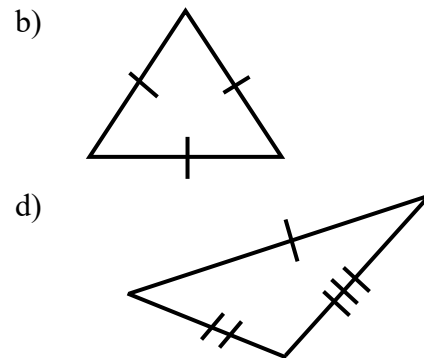
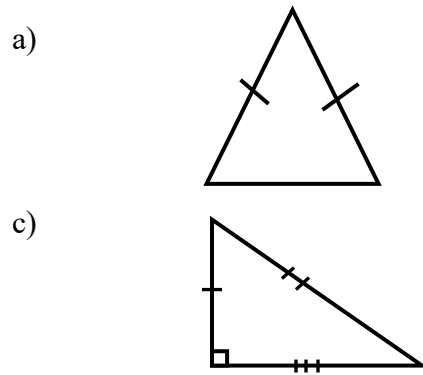
The diameter of the scoop of ice cream, which matches the diameter of the widest part of the cone, is 6 cm. The vertical height of the cone is 10 cm.

What expression can be used to calculate the volume of this entire object (cone + hemisphere of ice cream)?

- 33) State the value of each of the angles in the following diagrams:



34) Classify each type of the follow triangles:



35) Write each of the following in scientific notation:

a) 4 581

b) 31 523 872.2

c) 0.0000163

36) Convert each of the following from scientific notation to ordinary notation:

a) 7.123×10^6

b) 5.223×10^{-3}

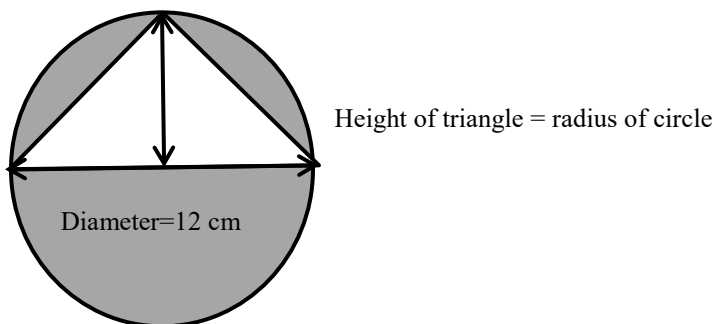
c) 3.441×10^{-5}

37) Simplify: $3(-7) - |-8(-2) - 5^2| + 9$

38) Divide 41.62 by 7.9. Answer in decimal form to the appropriate number of significant figures.

39) Clayton travelled 408 km in 5 hr. At this rate, how far would he travel in 12 hr? Answer to the nearest kilometre.

40) Determine the expression for the area of the shaded region. Use π where appropriate.



41) Simplify $9(25) - 3(5a - 12)$

42) Simplify $(5a - 2b^2)^2$

43) Simplify: $(3p^5r^2)^3$

44) Solve $6(x - 15) = 42$

45) Solve $\frac{5}{2}x - \frac{1}{4} = \frac{7}{8}$

46) Evaluate the polynomial $x^5 - 5x^4 + 3x^3 + 2x - 7$ when $x = -1$.

47) Evaluate the polynomial $x^5 - 5x^4 + 3x^3 + 2x - 7$ when $x = 2$.

48) The length of a rectangle is 15 m longer than three times the width. The perimeter of the rectangle is 74 m. Find the dimensions. Answer in fractional form using mixed numbers.

49) In a pile of quarters (25 cent coins) and loonies (dollar coins), there are 15 more quarters than loonies. The total value of the coins is \$21.25. How many quarters are there?

**Grade 9 Mathematics content, practice exercises for placement
into grade 10C (Math 180)**

Answer Key

- 1) a) 1, 2, 3, 4, 6, 9, 12, 18, 36
b) 1, 2, 3, 5, 6, 10, 15, 30
c) 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
- 2) a) improper: $\frac{23}{5}$ b) improper: $\frac{7}{5}$ c) improper: $\frac{11}{4}$
mixed: $4\frac{3}{5}$ mixed: $1\frac{2}{5}$ mixed: $2\frac{3}{4}$
- 3) a) $\frac{17}{40}$ b) $\frac{11}{10}$ or $1\frac{1}{10}$ c) $\frac{13}{15}$
- 4) a) $\frac{12}{35}$ b) $\frac{1}{7}$ c) $\frac{1}{2}$
- 5) a) $\frac{9}{11}$ b) $\frac{3}{14}$ c) 2
- 6) a) 0.375 b) 0.6 c) $0.\overline{2}$
- 7) a) \$16.50 b) \$16.00 c) \$3.30
- 8) \$17.85
- 9) \$34.56
- 10) \$87.55
- 11) a) A^3 b) b^4 c) k^6
- 12) a) $\frac{3}{4}, 0.7, \frac{2}{5}, -0.545454, -\frac{2}{3}$ b) $\frac{7}{3}, 0.99, \frac{3}{5}, -0.111111, -\frac{2}{3}$
- 13) a) $-\frac{5}{10}, -0.2222, \frac{1}{2}, 0.585858, \frac{5}{4}$ b) $-2.0022, -\frac{1}{3}, 0.141414, \frac{1}{6}, \frac{9}{8}$
- 14) a) -180 b) 16 c) 10
- 15) a) 8 b) 5 c) 6

- 16) 4 m
- 17) 13 m
- 18) 10 m
- 19) 78 pieces
- 20) 120 tiles
- 21) 375 tiles
- 22) $68.75\pi \text{ cm}^3$
- 23) $1800\pi \text{ cm}^3$
- 24) $300000\pi \text{ cm}^3$
- 25) 2.4 cm
- 26) $\frac{7}{2} \text{ mm}$ or $3\frac{1}{2} \text{ mm}$
- 27) 4 m
- 28) 10 m
- 29) 4 m
- 30) 53.3 m
- 31) $\left(\frac{147}{2}\pi + \frac{343}{12}\pi\right)m^3$
- 32) $48\pi \text{ cm}^3$

- 33) a) A - 143°
 B - 37°
 C - 143°
 D - 143°
 E - 37°
 F - 37°
 G - 143°
- b) J - 51°
 K - 129°
 L - 129°
 M - 51°
 N - 51°
 O - 129°
 P - 51°
- 34) a) isosceles b) equilateral, equiangular c) right-angle, scalene d) scalene
- 35) a) 4.581×10^3 b) 3.15238722×10^7 c) 1.63×10^{-5}
- 36) a) 7123000 b) 0.005223 c) 0.00003441
- 37) -21
- 38) 5.3
- 39) 979 km
- 40) $(36\pi - 36)cm^2$
- 41) $3a - 9$
- 42) $25a^2 - 20ab^2 + 4b^4$
- 43) $27p^{15}r^6$
- 44) $x=22$
- 45) $x = \frac{9}{20}$
- 46) -18
- 47) -27
- 48) $width = 5\frac{1}{2}m; length = 31\frac{1}{2}m$
- 49) There are 29 quarters. (There are also 14 loonies.)

Formula Sheet:**for Placement into Math 10C Equivalency (Math 180)**

Pythagorean Theorem	$c^2 = a^2 + b^2$
Triangle	$A = \frac{1}{2}bh$
Square	$A = s^2$
Rectangle	$A = lw$
Parallelogram	$A = bh$
Circle	$C = 2\pi r$ $A = \pi r^2$
Rectangular solid	$V = lwh$ $A = 2lw + 2lh + 2wh$
Right circular cylinder	$V = \pi r^2 h$ $A = 2\pi r^2 + 2\pi rh$
Right prism	$V = Bh$ (B = area of the base)
Right circular cone	$V = \frac{1}{3}\pi r^2 h$ $A = \pi r^2 + \pi rs$ (s = slant height)
Sphere	$V = \frac{4}{3}\pi r^3$ $A = 4\pi r^2$