Academic Upgrading

Academic Services

Study Guide for Placement into Grade 12 (Applied Math 30/Math-172) Math

Updated: April 2021

<u>Important Information</u>

The Math Placement Test

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-172 (Applied Math 30) is 60%.
- We aim to put students' passing marks on our system within 2 business days of successful completion of the <u>test</u>.*
  - *Students must have a SAIT ID number in order for us to enter their marks.*
- 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 tests.
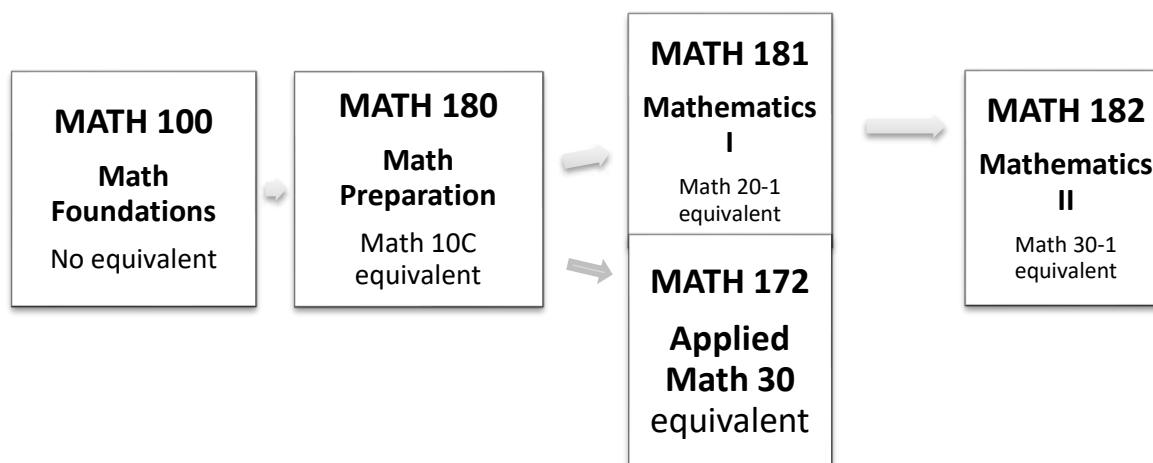
Math Placement Study Guide

This study guide is designed to prepare students for the Academic Upgrading Math Placement test for Applied Math 30 (Math 172). Use the following grade 10 practice exercises to prepare for your online placement test to meet eligibility for Applied Math 30. An answer key is included at the end of this guide.

This test is for placement into grade 12 Applied Math 30 equivalency (Math 172):
- This test (16 questions) is to be attempted
- The test is to be completed in 60 minutes.
- A passing mark of 60% or greater is required in this test for eligibility to register for Math 172
- You only require a calculator for the a few questions in this test; the majority of the questions do not require a calculator. You are provided with a formula sheet (identical to formula sheet in this guide), which you should download and/or print and have on hand for the test.
- **Instructions for each test are also provided at the start of the test and may differ from this Study Guide.**

SAIT Academic Upgrading Course Sequence

MATH 100	MATH 180	MATH 181	MATH 182
Math Foundations	**Math Preparation**	**Mathematics I**	**Mathematics II**
No equivalent	Math 10C equivalent	Math 20-1 equivalent	Math 30-1 equivalent

MATH 172

Applied Math 30 equivalent

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. Math 172 (Applied Math 30) is a legacy course and may not be accepted in other post-secondaries but is still accepted at SAIT for many of our programs.

Please review your future program's math admission requirements on www.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 10 Mathematics content – Practice Exercises (Non-calculator portion)

These will be similar to what you will be tested on in the placement test into Grade 12 (Applied Math 30/Math 172) math.

(All are to be completed without using a calculator – unless otherwise indicated)

1) Add the following numbers: $2\dfrac{3}{5}+1\dfrac{5}{6}$.

2) Perform the following subtraction: $\dfrac{7}{3}-\dfrac{13}{14}$.

3) Multiply the following numbers: $-\dfrac{9}{14}\times\dfrac{28}{27}$. Express your answer in reduced form.

4) Perform the following division: $-\dfrac{6}{15}\div\left(-\dfrac{16}{25}\right)$. Express your answer in reduced form.

5) Which set of numbers represents the prime factorization of 192?

6) Determine the square root of 441.

7) Estimate the square root of 45 to the nearest tenth.

8) Simplify the following radical expression into a mixed radical by leaving the smallest possible integer under the radical: $\sqrt{396}$

9) Convert the following mixed radical product into a single simplified radical expression: $5\sqrt{3}\times3\sqrt{6}$

10) Simplify the following exponent expression: $(3a^2)(5a^3)$

11) Simplify the following exponent expression: $-2y^{-3}(3y^3)^4$

12) Simplify the following exponent expression: $(4x^3)3x^{-2}$

13) Simplify the following exponent expression: $\left(\dfrac{3}{5}\right)^{-3}$

14) Perform the following multiplication: $(3x-4)^2$

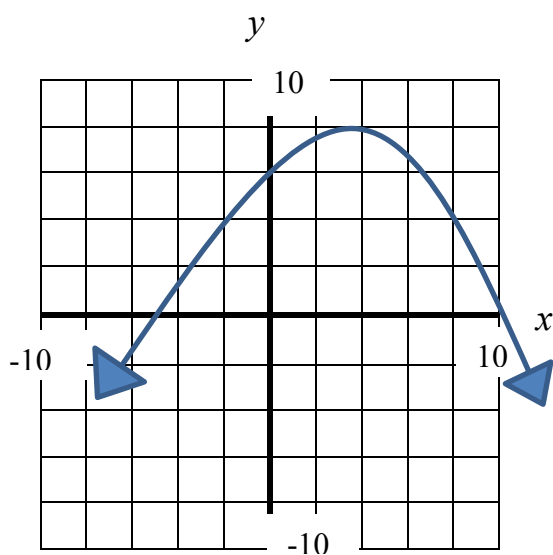**15)** Factor the following expression: $x^3 - 1$

16) Factor the following expression: $24x^6 + 18x^5 - 3x^4$

17) Factor the following expression: $9x^2 - 16y^2$

18) Factor the following expression: $x^2 - 9x - 36$

19) Factor the following expression: $6x^2 - 19x + 15$

20) Determine the domain and range of the following graph.

Math Placement Test Study Guide | Grade 10 Exercises – for placement into grade 11 (Math 20-1/Math 181) Math

21) Explain why the following set of ordered pairs could not be part of a function:
   (-3, 2), (2, -1), (-3, 5), (½ , ¼)

22) Determine the slope of a line segment with end points (3, 1) and (6, -11).

23) A line with slope ¼ passes through (-2, -4). Determine the y-value of a point where $x = -1$.

24) Determine if the following equations represent lines that are parallel to each other, perpendicular to each other, or neither.
$$2x - 3y = 1 \text{ and } 2y + 3x = 2$$

25) Given that $f(x) = -2x^2 + 3x - 1$, determine $f(-1/3)$.

26) Determine the ordered pair solution to following system of equations:
   $3x - 2y = 1 \text{ and } x + 2y = 2$

Grade 10 Mathematics Exercises for placement into grade 12 (Applied Math 30) math (Scientific calculator portion)
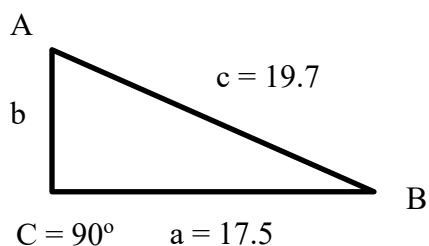
27) Determine csc 17.3° to 4 decimal places.

28) Determine angle A to the nearest tenth of a degree when sin A = 0.4552.

**29)** Determine angle A to the nearest tenth of a degree when sec A = 1.4965.

30) Convert 191 lb (pounds) to kg (kilograms) to 3 significant figures. 1 kg = 2.205 lb.

31) Given a right triangle with C = 90.0°, c = 19.7 and a = 17.5, determine the length of side b.

A

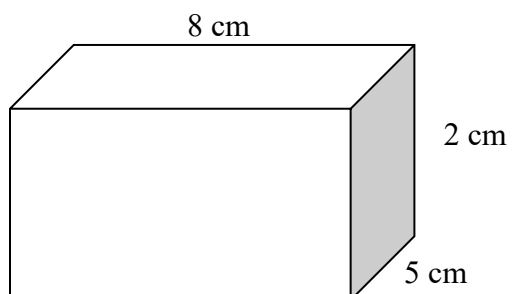c = 19.7

b

B

C = 90°   a = 17.5

**32)** Using the right triangle from the previous question, determine angle A.

33) Determine the volume of the following pyramid with a square base of 40.0 cm on each side and an overall height of 30.0 cm.

30

40
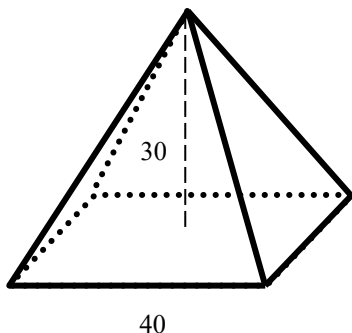
34) Determine the volume and total surface area of the following closed box:

8 cm

2 cm

5 cm

35) Given that the volume and height of a right circular cone are, respectively, 519 cm^3 and 19.2 cm, determine the diameter of the top.

19.2
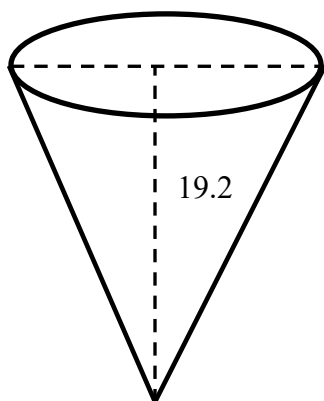
Grade 10 Mathematics content – for placement into grade 12 (Applied Math 30/Math-172)

Answer Key

1) $4\dfrac{13}{30}$ **2)** $\dfrac{59}{42}$ **3)** $-\dfrac{2}{3}$ **4)** $\dfrac{5}{8}$

5) 2 x 2 x 2 x 2 x 2 x 2 x 3

6) 21

7) 6.7

8) $6\sqrt{11}$

9) $45\sqrt{2}$

10) $15a^5$

11) $-162y^9$

12) $12x$

13) $\dfrac{125}{27}$

14) $9x^2 - 24x + 16$

15) $(x - 1)(x^2 + x + 1)$

16) $3x^4(8x^2 + 6x - 1)$

17) $(3x + 4y)(3x - 4y)$

18) $(x - 12)(x + 3)$

19) $(2x - 3)(3x - 5)$

20) Domain: $x \in R$; Range: $y \in R,\ y \leq 8$

21) The 2 points (-3, 2) and (-3, 5) have the same x value. In a function, a specific value of x can only map to a single value of y.

22) $-\dfrac{4}{1}$ $or -4$

23) $y = -\dfrac{15}{4}$

24) The slopes are negative reciprocals indicating perpendicular lines.

25) $-2\dfrac{2}{9}$ $or -\dfrac{20}{9}$

26) $\left(\dfrac{3}{4}, \dfrac{5}{8} \right)$

27) 3.3628

28) 27.1º

29) 48.1º = A

30) 86.6 kg

31) b = 9.05

32) A = 62.7º

33) 16000 cm³

34) SA = 132 cm²; V = 80 cm³

35) 10.2 cm

Grade 10 and 11 Formula Sheet

Volume of a right prism: $\quad$ V = Bh
Volume of a right circular cone: $\quad V = \dfrac{1}{3}\pi r^2 h$
Volume of a right pyramid: V = Bh/3
Volume of a right circular cylinder: $V = \pi r^2 h$
B is the area of the base (or top) and h is the overall height of the figure.
Surface area of a right prism: sum of the areas of all the faces (all rectangles where A = lw)
Surface area of a circular cone: $SA = 2\pi r^2 + 2\pi rs$ where s is the slant height.
Surface area of a pyramid: SA = B + sum of the side triangular faces where each face has a slant height.
Surface area of a right circular cylinder: $SA = 2\pi r^2 + 2\pi rh$
B is the area of the base (or top) and h is the overall height of the figure. Note that Lateral surface area does not include the B for all of these figures.

Area of a circle: $A = \pi r^2$	Circumference of a circle: $c = 2\pi r$

Straight line: Ax + By + C = 0 (general form)
Linear equation (slope-intercept form): y = mx + b
Linear equation (point-slope form): $y_2 - y_1 = m(x_2 - x_1)$

Definition of slope: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$	Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Quadratic equation: $ax^2 + bx + c = 0$	Quadratic formula: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Law of sines: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$	Law of cosines: $c^2 = a^2 + b^2 - 2ab\cos C$ $a^2 = b^2 + c^2 - 2bc\cos A$ $b^2 = a^2 + c^2 - 2ac\cos B$