ASSESSMENTS FOR SUCCESS

SAMPLE QUESTIONS - TECHNICAL MATH ASSESSMENT

MULTIPLE CHOICE TIMED FOR 1 HOUR AND 30 MINUTES

TOPICS:

1. FRACTIONS
2. DECIMALS
3. PERCENTS
4. ORDER OF OPERATIONS
5. LAWS OF SIGNS
6. EXPONENTS
7. BASIC ALGEBRA
8. EQUATIONS
9. RADICALS
10. ALGEBRAIC FRACTIONS

Please note, the sample questions were designed to show the types of questions and topics that will be covered. Calculators are not permitted on the test, although calculators may be used for the sample questions.
Calculations will be more straightforward on the test. The test is multiple choice. Scrap paper will be supplied.

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Topic 1: Fractions

1) Reduce $\frac{9}{36}$

2) Convert this fraction into a mixed number in lowest terms $\frac{60}{25}$

3) Find the Least Common Denominator of $\frac{1}{3}, \frac{1}{15}, \frac{1}{9}$

4) Two pins measure $\frac{3}{6}$ and $\frac{4}{9}$

   a) What is the length of the larger pin?

   b) What is the length difference between the two pins?

5) Add the fractions and bring your answer to lowest terms $\frac{1}{5} + \frac{1}{10} + \frac{1}{6}$

6) Add $2\frac{1}{2} + \frac{1}{4} + \frac{1}{5}$

7) Add $4\frac{1}{3} - 1\frac{1}{7}$

8) Multiply $4\frac{2}{9} \times 1\frac{1}{6}$

9) Divide $3\frac{1}{2} \div 1\frac{2}{3}$

10) Simplify $\frac{9\frac{3}{4}+\frac{1}{5}}{\frac{5}{8}}$

11) Find the value of x given $\frac{x}{23} = \frac{15}{3}$

Topic 2: Decimals

1) Divide 1.3289 by 0.431 and round to three decimal places.

2) Convert $158\frac{3}{5}$ to a decimal. Round to one decimal place.

3) Convert 11.78 to a mixed fraction.

4) Evaluate 2 300 + 3.13 + 1.09. Round to one decimal place.

5) Evaluate 1.35 – 26.491 + 11.7. Round to three decimal places.

6) Evaluate 0.6 × 12.34 × 1.4. Round to two decimal places.

7) Divide 1.113 by 0.56. Round to three decimal places.

8) Determine the volume of an aquarium with these definitions:
   Length = 78 cm; Width = 6 cm; Height = 43 cm.

9) Bob makes $888.87 per week before deductions.
   a. The following deductions are made from his pay cheque:
      Income Tax = $124.00;
      Company Pension = $42.86;
      C.P.P. = $38.97; and
      Dental Plan = $31.97.
   b. What are his total Deductions? What is his take-home pay?

10) Determine how much change you would get from $100 if you purchased 31.9 litres of gas at a cost of 96.7 cents per litre.

Topic 3: Percents

1) Express the following as percents:

Decimal	Percent
a) 0.62	
b) 3.312	
c) 13	

2) Express the following percents as decimals:

Percent	Decimal
a) 79 %	
b) 317.2 %	
c) $14\frac{1}{3}$ %	

3) Express the following fractions as percents:

Fraction	Percent
a) $\frac{887}{962}$	
b) $\frac{14}{100}$	
c) $7\frac{7}{14}$	

4) Express the following percents in fractional form in lowest terms:

Percent %	Fraction Form
a) 86 %	
b) 52 %	
c) $7\frac{1}{2}$ %	

5) Determine $89\frac{1}{2}\%$ of \$3 633 rounded to the nearest cent.

6) 316 kg is 15% of what measurement?

7) Helmer Co. Produces 1 090 DVD's per year. If 1.4% of these are defective, how many defective DVDs are produced per year? Round your answer to the nearest whole number.

8) Mohawk Digital Centre sells webcams for \$120 each. In an attempt to increase profit, they increased the price by \$5.81. Express this increase as a percent of the original price.

9) Mohawk Digital Centre sells digital cameras for \$390.45 each. In an attempt to increase sales, they reduced the price by 2%. What is the new price after the reduction?

Topic 4: Order of Operations

1) Evaluate the expression to two decimal places:

$5 + 5 - 8 + 4 \div 6$

2) Evaluate the expression to two decimal places:

$(2 \div 6 \times 5)^2 \div 5 - 6$

3) Evaluate the expression to two decimal places:

$6 - [8 - (2 + 9 \times 3)]$

4) Evaluate the expression to two decimal places:

$4^2 - \{9^3 + [1^3 - (4 + 3)]\}$

5) The formula to obtain the area of a certain shape is:

$$Area = \frac{L}{2}(w + d - t)$$

Determine the area when:

$L = 18$ m; $t = 2.3$ m; $w = 4.6$ m; $d = 10.1$ m

6) Calculate the future value of S of an annuity using the following formula:

$$S = R\left[\frac{(1+i)^n - 1}{i}\right]$$

Given: $R = \$250;\ i = 0.01;\ n = 13$

7) Calculate the Book Value B using the following formula:

$$B = P - \left[\frac{5m(2n - 0.75m)}{n^3 - 2}\right](P - S)$$

Given: $P = \$151\ 788;\ m = 9;\ n = 11;\ S = \$35\ 000$

Topic 5: Laws of Signs

1) Simplify: $-[+(-19)]$

2) Simplify: $-[-(-234)]$

3) True or False? $|-88| = |88|$

4) True or False? $-96 \rangle -105$

5) Evaluate: $7 + \frac{1}{-3} + 4\frac{1}{6}$

6) Evaluate:

7) $\left(7\frac{1}{3}\right)\left(\frac{3}{-4}\right) \div (-2)$

8) A person leaves the bus terminal and goes 15 blocks WEST for coffee. Next, he goes 2 blocks EAST to mail a letter and then 5 blocks WEST to visit a friend. Upon leaving his friend's house he is struck by a car and an ambulance takes him 9 blocks EAST to the hospital. Determine the direction and number of blocks he must travel from the hospital to make it back to the bus terminal.

Topic 6: Exponents

Enter your answer in fraction form:

1) Evaluate:

$$\left(\frac{2}{8}\right)^2$$

2) Evaluate:

$$(5^2)^2$$

3) Evaluate:

$$(4x)^{-3}; \qquad 4x^{-3}; \qquad 4(x)^{-3}$$

4) Evaluate:

$$-4A^2(3AB^3 + 4A^4B + 6A^{-5}B^4)$$

5) Simplify:

$$\left(\frac{2}{3}x^2\right)(15x^2 - 9)$$

6) Simplify:

$$\frac{17x^7y^9}{30x^1y}$$

7) Simplify:

$$(2x^7y^4)^3$$

8) Simplify:

$$\frac{3y(3x + y^2)^{19}}{10x(3x + y^2)^3}$$

9) Simplify and eliminate all negative exponents:

$$\frac{6x^{-2}y^4}{12x^4y^{-4}}$$

10) Simplify and eliminate all negative exponents:

$$4(x^{-7}y^2)^{-3}$$

Topic 7: Basic Algebra

1) Perform the indicated operations and simplify:

   $3a - 3b - 27a + 9b$

2) Simplify. Round the coefficient part of your answer to four decimal places:

   $\frac{3x}{2} + 4x - x$

3) Perform the indicated operations and simplify:

   $5x - 3[(11x - 5) - (x - 2)]$

4) Perform the indicated operations and simplify:

   $13x - (x - 3y) - [2x - (x - y)]$

5) Perform the indicated operations and simplify:

   $(x^2 - xy - 5y^2) - (19x^2 - 7xy - y^2)$

6) Expand and Simplify:

   $(3a - 5b)^2$

7) Perform the indicated operation(s) and simplify:

   $18xy(3x^2)$

8) Perform the indicated operations and simplify:

   $(x - 24)(3x^2 - 3x - 4)$

9) Perform the indicated operations and simplify:

   $23(x + y)(4y)(y^4)$

10) Perform the indicated operations and simplify:

   $\frac{240a^2b - 60ab + 105ab^2}{30ab}$

Topic 8: Equations

1) Solve for B in fraction form:

   $4B + 15 = 100$

2) Solve for x:

   $ad = 12ax + 25$

3) Solve for x in fraction form:

   $\frac{3}{3}x + 16 = 19$

4) Solve for E in fraction form:

   $7E + 3(8 - 4E) = -20$

5) Solve for y:

   $V = \frac{t}{7}(x + y)$

6) Solve for x:

   $\frac{3x-1}{2} = \frac{1}{2} + \frac{2x-1}{2} + 1$

7) Solve for R:

   $D = \sqrt{\frac{R-r}{R+r}}$

8) A formula used for gear calculation is:

   $$S = T - \frac{1.299}{N}$$

   a. Solve for N

   b. Calculate the value of N when $S = 49$ and $T = 60$

9) A formula used in pipe calculation is:

   $A = \frac{M}{P}(P + t)$

   a. On a piece of paper, re-write this formula and solve for t, the pipe thickness.

   b. Determine the value of t when $A = 48.31, M = 16.12$ and $P = 3.55$

Topic 9: Radicals

1) Write the expression in exponential form:

   a. $\sqrt{x}$

   b. $\sqrt[3]{x^2}$

   c. $\sqrt[4]{ab}$

   d. $\sqrt{a^3b^5}$

2) Evaluate:

   a. $\sqrt{9}$

   b. $\sqrt[3]{27}$

   c. $\sqrt[4]{256}$

   d. $\sqrt[3]{-125}$

3) Simplify each of the following:
   Assume that x, y and z are positive real numbers.

   a. $\sqrt{4x^2y^4}$

   b. $\sqrt{25x^6y^2z^8}$

   c. $\sqrt[3]{x^3y^6}$

   d. $\sqrt[3]{27x^6y^9z^4}$

Topic 10: Algebraic Fractions

1) Perform the given operation and simplify the following algebraic fractions:

   a. $\frac{x}{2} - \frac{y}{4}$

   b. $\frac{3x}{y} + \frac{4}{3y}$

2) Multiply and simplify the following algebraic fractions:

   a. $\frac{b}{2a} \cdot \frac{3ab}{a-b}$

   b. $\frac{x}{3y} \cdot \frac{6y}{x-y}$

   c. $\left(1 + \frac{a}{b}\right) \cdot \frac{a}{a+b}$

   d. $\left(1 + \frac{b}{a}\right) \cdot \frac{2a}{a+b}$

3) Divide and simplify the following algebraic fractions:

   a. $\frac{ab}{c} \div \frac{ab}{d}$

   b. $\frac{ab}{2c} \div \frac{ab}{6d}$

   c. $\left(1 - \frac{a}{b}\right) \div \left(1 + \frac{a}{b}\right)$

   d. $\left(1 - \frac{2m}{n}\right) \div \left(1 + \frac{2m}{n}\right)$

Answer Sheet – Technical Math

Topic 1: Fractions

1) $\frac{1}{4}$
2) $2\frac{2}{5}$
3) 45
4) $\frac{1}{2}, \frac{1}{18}$
5) $\frac{7}{15}$
6) $2\frac{19}{20}$
7) $3\frac{4}{21}$
8) $4\frac{25}{27}$
9) $2\frac{1}{10}$
10) $15\frac{23}{25}$
11) 115

Topic 2: Decimals

1) 3.083
2) 158.6
3) $11\frac{39}{50}$
4) 2,304.2
5) 13.441
6) 10.37
7) 1.988
8) 20, 124 cm^3
9) \$237.80; \$651.07
10) \$69.15

Topic 3: Percents

1)
   a. 62 %
   b. 331.2 %
   c. 1 300 %

2)
   a. 0.79
   b. 3.172
   c. 0.143

3)
   a. 92.2 %
   b. 14 %
   c. 750 %

4)
   a. $\frac{43}{50}$
   b. $\frac{13}{25}$
   c. $\frac{3}{40}$

5) $3251.54

6) 2 106.67 kg

7) 15

8) 4.84%

9) $382.64

Topic 4: Order of Operations

1) 2.67

2) -5.44

3) 27

4) -707

5) 111.6 m^2

6) $3452.33

7) $91482.68

Topic 5: Laws of Signs

1) 19
2) -234
3) True
4) True
5) $10\frac{5}{6}$
6) $2\frac{3}{4}$
7) Nine blocks in the East Direction

Topic 6: Exponents

1) $\frac{1}{16}$
2) 625
3) $\frac{1}{64x^3}$; $\frac{4}{x^3}$; $\frac{4}{x^3}$
4) $-12A^3B^3 - 16A^6B - 24A^{-3}B^4$
5) $10x^4 - 6x^2$
6) $\frac{17x^6y^8}{30}$
7) $8x^{21}y^{12}$
8) $\frac{3y(3x+y^2)^{16}}{10x}$
9) $\frac{y^8}{2x^6}$
10) $\frac{4x^{21}}{y^6}$

Topic 7: Basic Algebra

1) $-24a + 6b$
2) $4.5x$
3) $-25x + 9$
4) $11x + 2y$
5) $-18x^2 + 6xy - 4y^2$
6) $9a^2 - 30ab + 25b^2$
7) $54x^3y$
8) $3x^3 - 75x^2 + 68x + 96$
9) $92xy^5 + 92y^6$
10) $\frac{16a-4+7b}{2}$

Topic 8: Equations

1) $B = \frac{85}{4}$
2) $x = \frac{ad-25}{12a}$ or $x = \frac{d}{12} - \frac{25}{12a}$
3) $x = 9/2$
4) $E = \frac{44}{5}$
5) $y = \frac{7V}{t} - x$ or $y = \frac{7V-tx}{t}$
6) $x = \frac{1.5}{0.5} = 3$
7) $\frac{-r(1+D^2)}{(D^2-1)}$ or $\frac{-r-D^2r}{(D^2-1)}$
8) a. $N = -\frac{1.299}{(S-T)}$ b. 0.118
9) a. $t = \frac{AP}{M} - P$ b. $t = 7.09$

Topic 9: Radicals

1)

a. $x^{\frac{1}{2}}$

b. $x^{\frac{2}{3}}$

c. $(ab)^{\frac{1}{4}}$ or $a^{\frac{1}{4}}b^{\frac{1}{4}}$

d. $(a^3b^5)^{\frac{1}{2}}$ or $a^{3/2}b^{5/2}$

2)

a. 3 b. 3

c. 4 d. -5

3)

a. $2xy^2$

b. $5x^3yz^4$

c. xy^2

d. $3x^2y^3z^{\frac{4}{3}}$

Topic 10: Algebraic Fractions

1)

a. $\frac{2x-y}{4}$ b. $\frac{9x+4}{3y}$

2)

a. $\frac{3b^2}{2a-2b}$ b. $\frac{2x}{x-y}$

c. $\frac{a}{b}$ d. 2

3)

a. $\frac{d}{c}$ b. $\frac{3d}{c}$

c. $\frac{b-a}{b+a}$ d. $\frac{n-2m}{n+2m}$