

Instructor: Frank Secretain  
Course: Math 150  
Date: May 27, 2026

Assessment: Test 1  
Time allowed: 110 minutes  
Devices allowed: Pencil, pen, eraser, calculator  
Notes from instructor: Be neat. Show your work where needed. Box final answers.

Marks allocated: 7 questions worth 25 marks  
Percentage of final grade: 25% of final grade

## Formula Sheet

### Order of Operations

$$ac + bc = c(a + b)$$

exponents

$$a^n a^m = a^{n+m}$$

$$(a^n)^m = a^{nm}$$

$$(ab)^n = a^n b^n$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

radicals

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

### Unit Conversions

angles

$$2\pi = 6.28 \text{ rad} = 360^\circ$$

mass

$$1 \text{ kg} = 2.2 \text{ lbs.}$$

lengths

$$1 \text{ mile} = 1.6 \text{ km}$$

$$1 \text{ inch} = 2.54 \text{ cm}$$

$$1 \text{ m} = 3.3 \text{ ft}$$

volumes

$$1 \text{ gallon} = 3.78 \text{ Litres}$$

Concentrations (assume density of solvent water = 1 g/mL)

$$C = M/V = M/M = V/V$$

percentage (%)

$$x\%(w/v) = \frac{x[g]}{100[mL]} \quad x\%(v/v) = \frac{x[mL]}{100[mL]} \quad x\%(w/w) = \frac{x[g]}{100[g]}$$

parts

$$pph = x\%(w/v) \quad ppt = \frac{x[g]}{1[L]} \quad ppm = \frac{x[mg]}{1[L]} \quad ppb = \frac{x[\mu g]}{1[L]}$$

molarity

$$M = \text{molarity} \frac{[moles]}{[L]} \quad FW = \text{formula weight} \frac{[g]}{[mole]}$$

Dilutions

$$C_1 V_1 = C_2 V_2 \quad \text{dilution} = \frac{\text{solute volume}}{\text{total/final volume}} \quad \text{dilution factor (DF)} = \frac{1}{\text{dilution}}$$

(4 marks) Match the “type of number” with the best “example number”. Draw a line to match the “type of number” to the “example number” to indicate your answer.

irrational	$\sqrt{1}$
integer	$-1.1$
rational	$-\sqrt{2}$
natural	$-\sqrt{1}$

(3 marks) Determine

- the total number of significant digits and
- re-write the number in scientific notation

for the following number:

450                      a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

23.40                    a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

0.00020                a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

(1 mark) Convert the decimal number to a fraction (show your work):

0.592

(1 mark) Convert the fraction to a mixed number (show your work):

$$\frac{57}{6}$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$3x^2 + \frac{1}{x - 2} + 3^{n-1} = 0$$

(5 marks) Given the standard unit conversion table on the formula sheet (1st page), convert each of the numbers to the stated units.

$$43.2 \frac{\text{m}}{\text{kg}} \rightarrow \frac{\text{ft}}{\text{lbs.}}$$

$$0.86 \frac{\text{mile}^2}{\text{gallon}} \rightarrow \frac{\text{km}^2}{\text{Litres}}$$

$$12.3 \frac{\text{kg}}{\text{L}} \rightarrow \frac{\text{lbs.}}{100 \text{ mL}}$$

(8 marks) Solve for x in the following equation.

$$\frac{5x}{9} - 2 = 9$$

$$\frac{3x^2}{c} + 8 = 10$$

$$\log(2x) - 3 = 1.1$$

$$10^x - 2 = 3.1$$

(4 marks) Match the "type of number" with the best "example number". Draw a line to match the "type of number" to the "example number" to indicate your answer.

irrational	<del>_____</del>	$\sqrt{1} = 1$
integer	<del>_____</del>	$-1.1 = -1.1$
rational	<del>_____</del>	$-\sqrt{2} = -1.414\dots$
natural	<del>_____</del>	$-\sqrt{1} = -1$

(3 marks) Determine

- the total number of significant digits and
- re-write the number in scientific notation

for the following number:

450

a) significant digits = 2

b) scientific notation =  $4.5 \times 10^2$

23.40

a) significant digits = 4

b) scientific notation =  $2.340 \times 10^1$

0.00020

a) significant digits = 2

b) scientific notation =  $2.0 \times 10^{-4}$

(1 mark) Convert the decimal number to a fraction (show your work):

0.592

$$0.592 \left( \frac{1000}{1000} \right) = \frac{592}{1000} = \frac{592 (\div 8)}{1000 (\div 8)} = \boxed{\frac{74}{125}}$$

(1 mark) Convert the fraction to a mixed number (show your work):

$$\frac{57}{6}$$

so

$$\boxed{\frac{57}{6} = 9 \frac{3}{6}}$$

$$57 \div 6 = 9.5$$

so

$$6 * 9 = 54$$

and

$$57 - 54 = 3$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$3x^2 + \frac{1}{x-2} + 3^{n-1} = 0$$

$$\boxed{3 * x^2 + 1 / (x - 2) + 3 ^ (n - 1) = 0}$$

(5 marks) Given the standard unit conversion table on the formula sheet (1st page), convert each of the numbers to the stated units.

$$43.2 \frac{\text{m}}{\text{kg}} \rightarrow \frac{\text{ft}}{\text{lbs.}}$$

$$43.2 \frac{\cancel{\text{m}}}{\cancel{\text{kg}}} \left( \frac{3.3 \text{ ft}}{1 \cancel{\text{m}}} \right) \left( \frac{1 \cancel{\text{kg}}}{2.2 \text{ lbs}} \right) = \boxed{64.8 \frac{\text{ft}}{\text{lbs}}}$$

$$0.86 \frac{\text{mile}^2}{\text{gallon}} \rightarrow \frac{\text{km}^2}{\text{Litres}}$$

$$0.86 \frac{\cancel{\text{mile}^2}}{\cancel{\text{gal}}} \left( \frac{1.6 \text{ km}}{1 \cancel{\text{mile}}} \right) \left( \frac{1.6 \text{ km}}{1 \cancel{\text{mile}}} \right) \left( \frac{1 \cancel{\text{gal}}}{3.78 \text{ L}} \right) = \boxed{0.58 \frac{\text{km}^2}{\text{L}}}$$

$$12.3 \frac{\text{kg}}{\text{L}} \rightarrow \frac{\text{lbs.}}{100 \text{ mL}}$$

$$12.3 \frac{\cancel{\text{kg}}}{\cancel{\text{L}}} \left( \frac{2.2 \text{ lbs}}{1 \cancel{\text{kg}}} \right) \left( \frac{1 \cancel{\text{L}}}{1000 \cancel{\text{mL}}} \right) \left( \frac{100 \cancel{\text{mL}}}{100 \text{ mL}} \right) = \boxed{2.71 \frac{\text{lbs}}{100 \text{ mL}}}$$

(8 marks) Solve for x in the following equation.

$$\frac{5x}{9} - 2 = 9$$

$$\cancel{9} \left( \frac{5x}{\cancel{9}} \right) = (11) 9$$

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{99}{\cancel{5}}$$

$$x = \frac{99}{5} = 19.8$$

$$\frac{3x^2}{c} + 8 = 10$$

$$\cancel{c} \left( \frac{3x^2}{\cancel{c}} \right) = (2) c$$

$$\frac{\cancel{3}x^2}{\cancel{3}} = \frac{2c}{3}$$

$$\sqrt{x^2} = \sqrt{\frac{2c}{3}}$$

$$x = \sqrt{\frac{2c}{3}} = \sqrt{0.\bar{6}c}$$

$$\log(2x) - 3 = 1.1$$

$$\log(2x) = 4.1$$

$$10^{\log(2x)} = 10^{4.1}$$

$$x = 6295$$

$$\frac{2x}{2} = \frac{12589.6}{2}$$

$$10^x - 2 = 3.1$$

$$10^x = 5.1$$

$$x = 0.708$$

$$\log(10^x) = \log(5.1)$$

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$$pph = x\%(w/v) \quad ppt = \frac{x[g]}{1[L]} \quad ppm = \frac{x[mg]}{1[L]} \quad ppb = \frac{x[\mu g]}{1[L]}$$

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(4 marks) Match the “type of number” with the best “example number”. Draw a line to match the “type of number” to the “example number” to indicate your answer.

imaginary	$-\sqrt{1}$
integer	$\sqrt{-1}$
rational	$-2.1$
whole	$\sqrt{1}$

(3 marks) Determine

- the total number of significant digits and
- re-write the number in scientific notation

for the following number:

10060                      a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

0.310                      a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

0.00470                    a) significant digits = \_\_\_\_\_

b) scientific notation = \_\_\_\_\_

(1 mark) Convert the decimal number to a fraction (show your work):

0.974

(1 mark) Convert the fraction to a mixed number (show your work):

$$\frac{43}{8}$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$2a^2 + \frac{1-x}{2a} + 2^{n-1} = 0$$

(5 marks) Given the standard unit conversion table on the formula sheet (1st page), convert each of the numbers to the stated units.

$$0.654 \frac{\text{Litres}}{\text{inch}} \rightarrow \frac{\text{gallons}}{\text{m}}$$

$$72.1 \frac{\text{mile}^2}{\text{gallon}} \rightarrow \frac{\text{km}^2}{\text{Litres}}$$

$$132 \frac{\text{lbs}}{\text{L}} \rightarrow \frac{\text{kg}}{100\text{mL}}$$

(8 marks) Solve for x in the following equation.

$$\frac{3x}{7} + 3 = 8$$

$$\frac{2x^3}{b} + 1 = 8$$

$$\log(x) - 2 = 1.3$$

$$10^x + 1 = 3$$

(4 marks) Match the "type of number" with the best "example number". Draw a line to match the "type of number" to the "example number" to indicate your answer.

imaginary	<del>_____</del>	<del><math>-\sqrt{1} = -1</math></del>
integer	<del>_____</del>	<del><math>\sqrt{-1} = i</math></del>
rational	_____	$-2.1 = -2.1$
whole	_____	$\sqrt{1} = 1$

(3 marks) Determine

- the total number of significant digits and
- re-write the number in scientific notation

for the following number:

10060

a) significant digits = 4

b) scientific notation =  $1.006 \times 10^4$

0.310

a) significant digits = 3

b) scientific notation =  $3.10 \times 10^{-1}$

0.00470

a) significant digits = 3

b) scientific notation =  $4.70 \times 10^{-3}$

(1 mark) Convert the decimal number to a fraction (show your work):

0.974

$$0.974 \left( \frac{1000}{1000} \right) = \frac{974}{1000} = \frac{974}{1000} \frac{(\div 2)}{(\div 2)} = \boxed{\frac{487}{500}}$$

(1 mark) Convert the fraction to a mixed number (show your work):

$$\frac{43}{8}$$

$$43 \div 8 = 5.375$$

so

$$5 * 8 = 40$$

and

$$43 - 40 = 3$$

so

$$\frac{43}{8} = \boxed{5 \frac{3}{8}}$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$2a^2 + \frac{1-x}{2a} + 2^{n-1} = 0$$

$$\boxed{2 * a^2 + (1-x) / (2 * a) + 2^{(n-1)} = 0}$$

(5 marks) Given the standard unit conversion table on the formula sheet (1st page), convert each of the numbers to the stated units.

$$0.654 \frac{\text{Litres}}{\text{inch}} \rightarrow \frac{\text{gallons}}{\text{m}}$$

$$0.654 \frac{\cancel{\text{L}}}{\cancel{\text{in}}} \left( \frac{1 \cancel{\text{inch}}}{2.54 \cancel{\text{cm}}} \right) \left( \frac{100 \cancel{\text{cm}}}{1 \text{ m}} \right) \left( \frac{1 \text{ gal.}}{3.78 \cancel{\text{L}}} \right) = \boxed{6.81 \frac{\text{gallon}}{\text{m}}}$$

$$72.1 \frac{\text{mile}^2}{\text{gallon}} \rightarrow \frac{\text{km}^2}{\text{Litres}}$$

$$72.1 \frac{\cancel{\text{mile}^2}}{\cancel{\text{gal.}}} \left( \frac{1.6 \text{ km}}{1 \cancel{\text{mile}}} \right) \left( \frac{1.6 \text{ km}}{1 \cancel{\text{mile}}} \right) \left( \frac{1 \text{ gal.}}{3.78 \text{ L}} \right) = \boxed{48.8 \frac{\text{km}^2}{\text{L}}}$$

$$132 \frac{\text{lbs}}{\text{L}} \rightarrow \frac{\text{kg}}{100\text{mL}}$$

$$132 \frac{\cancel{\text{lbs}}}{\cancel{\text{L}}} \left( \frac{1 \text{ kg}}{2.2 \cancel{\text{lbs}}} \right) \left( \frac{1 \Delta}{1000 \cancel{\text{mL}}} \right) \left( \frac{100 \cancel{\text{mL}}}{100 \text{ mL}} \right) = \boxed{6.00 \frac{\text{kg}}{100\text{mL}}}$$

.(8 marks) Solve for x in the following equation.

$$\frac{3x}{7} + 3 = 8$$

$$\cancel{7} \left( \frac{3x}{\cancel{7}} \right) = (5) \cancel{7}$$

$$x = 11.67$$

$$\frac{\cancel{3}x}{\cancel{3}} = \frac{35}{3}$$

$$\frac{2x^3}{b} + 1 = 8$$

$$\cancel{b} \left( \frac{2x^3}{\cancel{b}} \right) = (7) b$$

$$x = \sqrt[3]{\frac{7b}{2}} = \sqrt[3]{3.5b}$$

$$\frac{2x^3}{2} = \frac{7b}{2}$$

$$\sqrt[3]{x^3} = \sqrt[3]{\frac{7b}{2}}$$

$$\log(x) - 2 = 1.3$$

$$\log(x) = 3.3$$

$$10^{\log(x)} = 10^{3.3}$$

$$x = 1995$$

$$10^x + 1 = 3$$

$$10^x = 2$$

$$x = 0.30$$

$$\log(10^x) = \log(2)$$