PRACTICE QUESTIONS

Unit 1: Rational Numbers and Exponents

1. Evaluate

a) $3\frac{1}{8}-4\frac{1}{2}$ b) $-1\frac{1}{3}\div 2\frac{1}{27}$ c) $1\frac{3}{5}\times 1\frac{1}{4}$ d) $1\frac{2}{3}+2\frac{3}{4}$

2. Simplify writing as a single power

a) $4^2\times 4$ b) $\left(3^2\right)^4$ c) $\left(4^3\right)^2$ d) $\frac{4^7}{4^3}$ e) $\frac{3^7}{3^5}$

f) $\frac{g^5g^6}{g^7}$ g) $\frac{\left(x^2\right)^4}{\left(x^5\right)}$ h) $\frac{a^{10}}{\left(a^3\right)^3}$ i) $\frac{\left(\frac{1}{5}\right)^6 7^5}{5^{17}\left(5^4\right)^3}\times 5^{39}-5^4\times 7^5$

Unit 2: Algebra

1. Simplify

a) $-4x^2+xy-3x^2-7xy+5xy$

b) $7q^4x^2-2q^4x^2-m^4x^2+3x^2q^4-3xy$

c) $-6p^3g-3pg^2+4+5pg-2g^2p+5gp^3-3pg$

d) $(4m+3n)-(5m-3n)$

e) $(3y^2-4y+6)-(-y^2+8y-3)$

f) $(4x^2-2xk+9k^2)+(6x^2-7xk-6k^2)-(x^2-5xk-k^2)+(x^2-8xk-12k^2)$

2. Factor, where possible

a) $6d-21$ b) $9y^{10}-72y^7+6y^5$ c) $x^5y^6+125x^3y^5-100x^4y$

3. Divide

a) $\frac{28q+14pq^3}{7q}$ b) $\frac{(x-1)(x^3-2x^2+3x+5)}{x-1}$ c) $\frac{3x^3y^4-12x^2y^2}{3x^2y^2}-\frac{6x^2y^2-24x^3y^4}{2x^2y^2}-xy^2$

4. The ***surface area*** of a rectangle is given by the polynomial $9x^6y^7-6x^5y^5$ units. If one of the dimensions is $3x^3y^4$ units, what is the polynomial that represents the **perimeter of the rectangle?** Evaluate the perimeter for $x = 1$, $y = 2$.

Unit 3: Equations

1. Solve the following equations

(a) $3x+2=-7$ **(b)** $-3(5x-11)=-2$ **(c)** $28-y=5y-2$ **(d)** $\frac{j+2}{6}=\frac{5j-3}{10}-\frac{1}{30}$

(e) $\frac{3}{16}k-\frac{15}{12}=\frac{9}{8}k+\frac{3}{8}$ **(f)** $-3(5x-6)+2(3x-9)=3(-x-6)$

2. Given the two variable equation $4x-2y=1$

(a) Express *y* in terms of *x* (b) Express *x* in terms of *y* (c) Find *y* if $x = 4$ (d) Find *x* if $y = -2$.

3. Pamela, the owner of a coffee shop, wants to buy coffee from a supplier who sells two grades of coffee beans. One of the grades sells for \$8/*kg* and the other for \$10/*kg*. Pamela is willing to spend \$1700 on the purchase.

a) Determine the equation that describes the total cost of the purchase in terms of the amount of coffee (in Kilograms) from each grade of coffee beans.

b) If Pamela buys 150 *kg* of the cheaper coffee beans, how many kilograms of the other brand of coffee beans can she purchase?

4. The Celsius (C) and the Fahrenheit (F) temperature scales are related as $C=\frac{5}{9}(F-32)$.

(a) The standard cooking temperature of a household oven is 350 degrees Fahrenheit. Determine the oven's temperature in degrees Celsius.

(b) Determine the temperature for which the reading of a Fahrenheit graded thermometer is the same as a Celsius graded thermometer?

5. For each of the following, find two numbers *x* and *y* such that both equations are simultaneously satisfied and check your answer.

(a) $y=5x-3$, and $y=3x+1$ **(b)** $2x+3y-6=0$, and $2x+4y+1=0$

6. A father is 30 years older than the son. The father is three times as old as the son. Find the ages of the father and the son.

7. A candy store is making up a mixture of chocolate-coated almonds and chocolate-coated raisins. The almonds cost \$45/kg and the raisins cost \$15/kg. The final value of the mixture is to be \$210.

1. Write an equation that represents the total cost of the purchase in terms of the number of kilograms of almonds and raisins.
2. If the <u>total mass of almonds and raisins combined</u> is 10 kg, determine the mass of almonds and the mass of raisins purchased by the candy store.

8. The total cost of admission to an amusement park is \$350 for 3 adults and 2 children. An adult admission is \$25 more than a child's. Find the cost of admission for a group of 5 adults and 4 children?

Unit 4 + 5: Graphing Relations And Equation of A Straight Line

1. a) Find the *x* and *y*- intercepts of the line $y = -\frac{2}{3}x + 4$.

   b) Plot the line above using table of values, *x*, *y*- intercept , and the point-slope methods.

2. A line with equation $y = 4x + b$ passes through the point $(x, y) = (3,20)$. Find the value of b.

3. Find the equation of the line containing the points $(x, y) = (-6,24)$ and $(x, y) = (-4,4)$.

4. The standard form of the equation of a straight line is $Ax + By + C = 0$, $A \geq 0$.

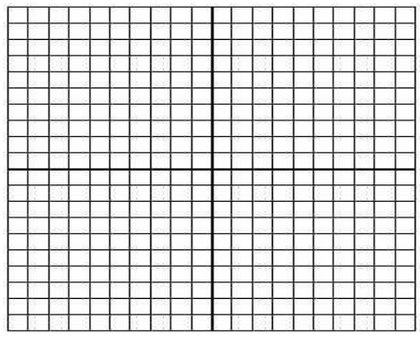
   a) Express the line $-12x + 3y + 6 = -50x + 12y - 10$ in standard form. What are the respective values of the constants *A*, *B*, and *C*?

   b) Express the line in $y = mx + b$ form, and state the slope and the *y*-intercept.

5. a) Find the equation of the line parallel to $y = \frac{2}{5}x + 3$ containing the point $(x, y) = (-5,3)$.

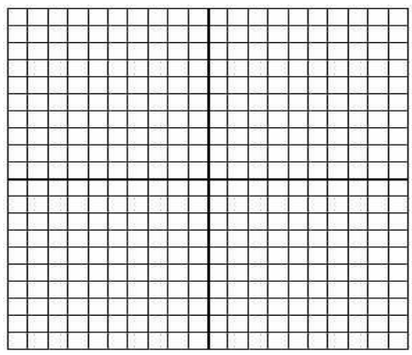
   b) Find the equation of the line perpendicular to $y = \frac{2}{5}x + 3$ containing the point $(x, y) = (2,1)$.

   c) Plot the three lines above.



6. a) Find the point of intersection for the lines $y = 2x - 7$ and $y = -4x - 1$ graphically.

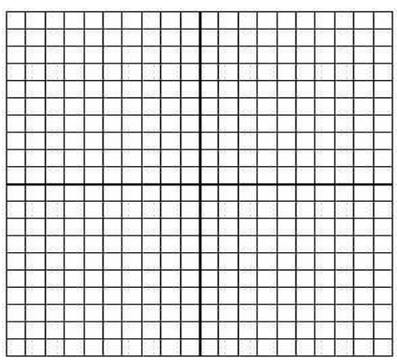
   b) Verify using the equations of the lines, that the two lines above pass through the point of intersection obtained in part (a).



7. Samantha drives to her cottage at a constant average speed. Her distance time data is given below.

   a. Use the method of finite differences to determine whether the relation is linear or non-linear, **and** plot the distance-time graph for Samantha's trip

Time (Hours)	Distance (Km)	Finite differences
0	0	
0.5	35	
1	70	
1.5	105	
2	140	

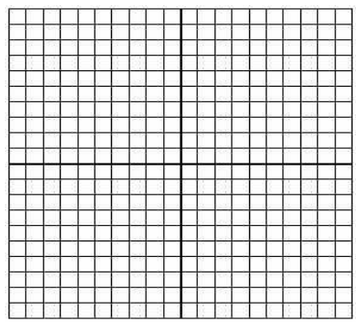


   b. Does the graph represent a partial or direct variation? Justify your answer

   c. Identify the independent and dependent variables?

d. Find the slope of the graph, and explain its meaning.
e. Determine an equation for the distance in terms of time.

8. Scuba divers experience an increase in pressure as they dive below sea level. The atmospheric pressure (in atmospheres) at various depths is shown.



a) Plot the pressure-depth graph

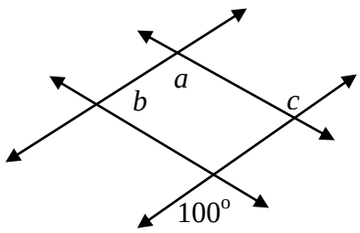
Depth (meters)	Pressure (atm)
10	2
20	3
30	4
40	5
50	6

b) Does the graph represent a partial or direct variation? Justify your answer
c) Identify the independent and dependent variables.
d) What is the atmospheric pressure at a depth of 35 m
e) At what depth is the atmospheric pressure 5.5 atm?
f) Determine an equation that relates the Pressure and the depth.

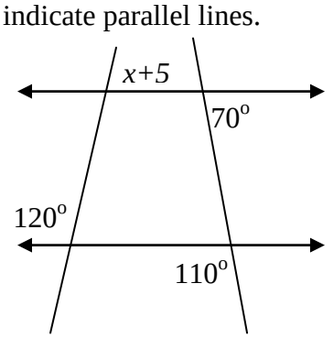
Unit 6: Geometry

1. Find the value of each variable. Double arrows indicate parallel lines.

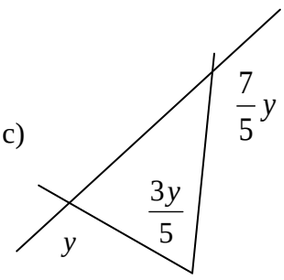
a)



b)



c)



2. Angle *A* is an internal angle of a polygon and angle *B* is the external angle defined at a common vertex. What is the value of *A* + *B*?

3. It was shown in class that the sum of the interior angles of a polygon (in degrees) $S = (n-2)180$. Use this result to show that the sum of the external angles of a polygon is always 360^0.

4. The sum of the interior angles of a polygon is 3420^o.
   a) Find the number of sides of the polygon.
   b) If the polygon is a regular polygon what is the measure of each interior and each exterior angle?

5. Each exterior angle of a regular polygon is 20^0. Determine the number of sides of the polygon.

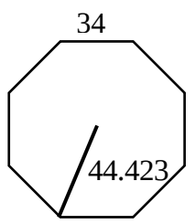
6. Each interior angle of a regular polygon is 170^o. How many sides does the polygon have?

7. State whether each of the following is true or false and justify your answer.
   a) There is a regular polygon for which each of the interior angles is 130^o.
   b) If the diagonals of a quadrilateral intersect at right angles, the quadrilateral is a square.

8. Straight lines are formed by joining two points on a circle.
   a) How many lines can be formed with $N = \{2, 3, 4, 5\}$ points?
   b) Write down an equation that represents the maximum number of distinct straight lines in terms of the number of points in the circle. Verify your formula for $N = 6$.

Unit 7: Measurement

1. Calculate the area of the regular polygon using the measurements given. All measurements are in centimeters.



2. The side of an equilateral triangle is 10 cm. Find the area of the triangle.

3. A regular hexagon has apothem 1 *cm* and surface area A = 5.2 cm^2. Find the length of each side of the hexagon.

4. The diameter of a cylinder is 6 cm and its height is 20 cm. Find the volume and the surface area of the cylinder.

5. The diameter of the circular base of a cone is 12 cm and its height is 24 cm. Find the volume and the surface area of the cone.

6. The surface area of a sphere is 30 cm^2. Determine the volume of the sphere.

7. The volume of a sphere is 400 cm^3. Determine the surface area of the sphere.

8. A solid cone-shaped moon - rock has surface area 250 cm^2. The diameter of the base of the cone is 10 cm. Determine the amount of material in the rock in cubic meters to one decimal place.

9. The base of a prism is in the shape of a regular pentagon. The length of each side of the pentagon is 14 cm and the apothem is 9.63 cm. The height of the prism is 30 cm.
   a) Sketch the prism, and calculate the volume and surface area of the prism to one decimal place.
   b) Calculate the volume and surface area of a pyramid with the same base and height as the prism.

10. a) Sketch three distinct rectangular prisms with volume 512 cm^3.
    b) Calculate the surface area of each of the prisms.
    c) Determine the dimensions of the prism with the same volume and minimum possible surface area.

11. Suppose that 1 cm^2 of aluminum costs $0.50.
    a) What is the minimum amount of money required to build a cylindrical can of volume 500 cm^3 ?
    b) How many litres of fluid can be stored in the can? Note that 1000 cm^3 = 1 L.

12. A cylinder has surface area 470 cm^2. What is the maximum possible volume of the cylinder?

13. Rogers's mom asked him to fill a container with water. The container is in the shape of a rectangular prism of surface area 600 cm^2. Roger claims that he filled the container with 2 L of water. Can Roger's statement possibly be correct? **[Hint:** A rectangular prism of a given surface area will have maximum volume if it is a cube. 1000 cm^3 = 1 L.**]**

Textbook REVIEW

Cumulative Review Test 1 (p. 249-250)
Cumulative Review Test 2 (p.339-340)
Cumulative Review Test 3 (p. 481-483)