



***URSULA  
FRANKLIN  
ACADEMY***

***GRADE 9 MATHEMATICS***

***PREPARATION  
RESOURCES***

Welcome to the Ursula Franklin Academy family!

This package, along with its accompanying online resources, aims to prepare you for the Mathematics program UFA. The focus is on some of the basic skills from the grades 7 and 8 curricula. These skills are the foundation upon which the high school Mathematics curriculum is built.

It is expected that all incoming grade 9 students complete these exercises with all pertinent steps shown. Answers are provided on the last page (please be sure to check your answers before moving on to the next topic).

Please bring your completed booklet to your first Math class in September. There will be a diagnostic test at the beginning of the course that will be based on the material in this booklet.

The accompanying online resources can be found on the school website:

[www.ufacademy.org](http://www.ufacademy.org)

(Follow the link to “ACADEMICS” then “Resources” either from the drop-down menu or at the bottom of the home page)

### **Online Resources:**

- Each section of the booklet (A-H) will have an accompanying video with a short lesson on the material covered in that section.
- Written solutions to the sample problems solved in the accompanying videos.
- Links to “Khan Academy” online exercises related to the material in this booklet. You can create an account or sign in with a Google or Facebook account. (The site includes online exercises and video lessons for most high school Mathematics topics, as well as video lessons for other subjects)
- Additional worksheets for those who prefer not to work online.
- Links to Waterloo Math contests as well as other sites for Mathematics enrichment.

**URSULA FRANKLIN ACADEMY**

**A – Operating with Integers** (*Answer without using a calculator*)

1.  $4 + (-3) =$

2.  $5 - 12 =$

3.  $-1 - (-1) =$

4.  $12 - (-12) =$

5.  $-5 - 4 =$

6.  $-6 - (-2) =$

7.  $4(-3) =$

8.  $(-4)(-3) =$

9.  $\frac{16}{-2} =$

10.  $\frac{-12}{-3} =$

11.  $\frac{-5}{-5} =$

12.  $(-5)^2 =$

13.  $-4^2 =$

14.  $3^3 =$

15.  $(-5)(-2)(2)(-5) =$

**B – Order of Operations** (*Answer without using a calculator*)

1.  $2 + 3 \times 5$

2.  $4(-2) - 8 \div 2$

3.  $-2(3 - 5) - 2^2$

4.  $-2(5 - 3^2) \div (-4)$

5.  $1 + (-1)(-1) - 1 \div (-1)$

6.  $-4(-3 - 6) + (-2 + (-1))$

7.  $3(-2 + 4)^3 - 2(-4 + 1)^2$

8.  $4[(32 - 5^2) - (2^3 - 2)]$

**URSULA FRANKLIN ACADEMY**

**C – Operating with Fractions** (*Answer without using a calculator.*)

1. Reduce the given fraction to its simplest form.

a)  $\frac{5}{35} =$

b)  $\frac{9}{12} =$

c)  $\frac{26}{30} =$

d)  $\frac{24}{36} =$

2. Compute. Give your answer in simplest form. (*Hint: simplify before operating, if possible.*)

a)  $\frac{2}{11} + \frac{5}{11}$

b)  $\frac{11}{18} - \frac{5}{18}$

c)  $\frac{1}{2} + \frac{1}{6}$

d)  $\frac{2}{9} - \frac{2}{3}$

e)  $\frac{2}{3} + \frac{1}{4}$

f)  $-\frac{5}{7} - \frac{1}{6}$

g)  $\frac{3}{10} + \frac{4}{15}$

h)  $\frac{5}{6} - \frac{3}{8}$

i)  $\frac{8}{25} + \frac{6}{100}$

j)  $\frac{7}{20} - \frac{8}{30}$

k)  $\frac{2}{3} \times \frac{4}{5}$

l)  $\frac{4}{7} \div \frac{3}{5}$

m)  $\frac{4}{9} \div 3$

n)  $\frac{12}{35} \times \frac{7}{8}$

o)  $\frac{16}{21} \div \frac{4}{3}$

**URSULA FRANKLIN ACADEMY**

**D – Variables and Equations** (Answer without using a calculator)

1. Write as a single expression.

a)  $x + x =$

b)  $(x)(x) =$

c)  $(x)(x)(x)(x)(x) =$

d)  $5x + 6x =$

e)  $12x - 5x =$

f)  $8x - 8x =$

2. Evaluate the expression given that  $x = 2$  and  $y = -3$ .

a)  $5x + 2y$

b)  $2(x + y)$

c)  $x^2 - y^2$

d)  $x - 3y$

3. Solve for  $x$  by using opposite operations. (Show your steps and do not use guess-and-check.)

a)  $x + 7 = 26$

b)  $x - 11 = 42$

c)  $8x = -24$

d)  $-5x = -30$

e)  $\frac{x}{5} = -6$

f)  $x^2 = 49$

g)  $2x - 5 = 27$

h)  $-3x + 8 = -22$

i)  $-x + 5 = 16$

j)  $\frac{x}{4} - 3 = -1$

k)  $\frac{x}{4} = \frac{5}{12}$

l)  $\frac{8}{x} = \frac{6}{5}$

**URSULA FRANKLIN ACADEMY**

**E – Ratios, Rates and Percentages** (*Show your steps. You may use a calculator. Approximate to one decimal place if necessary.*)

1. The ratio of koi to goldfish in all of the ponds at Hypatia Farm is 4:3.

a) If there are 24 koi in a pond, how many goldfish should there be?

b) If there are 66 goldfish in a pond, how many koi should there be?

c) If there are a total of 63 fish in a pond, how many koi and how many goldfish will there be?

d) What is the percentage of goldfish in any pond?

2. Write each of the following as a unit rate. (*Include the units.*)

a) Sharma walks 1200 metres in 9 minutes.

b) Viola pays \$14.30 to purchase 65 pounds of flour.

c) Leif earns \$665 for 38 hours of work.

3. Which is the better deal: 15 litres of milk for \$14.10 or 20 litres of milk for \$18.40?

**URSULA FRANKLIN ACADEMY**

4. A cookie recipe requires 220 grams of flour for every 45 grams of sugar. How many grams of sugar would you need if you used 1 kilogram of flour?

5. There are 550 spectators at the high school soccer game. 64% are children and the rest are adults. How many children and how many adults are watching the game?

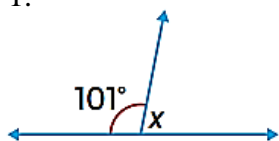
6. All Raptors jerseys are on sale at 35% off. If the original price of the jersey was \$88.99, what will the sale price be before taxes?

7. A plate of spaghetti Bolognese costs \$15 at Costa del Mare restaurant. If they increase the price by 15%, what will the new cost be?

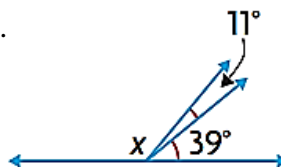
**F – Angles**

Determine the angles indicated using a geometric property. (*Show your steps. Do not use a protractor.*)

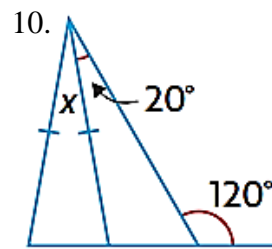
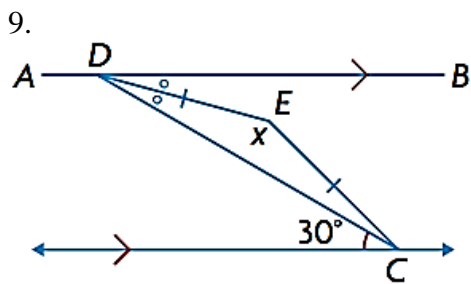
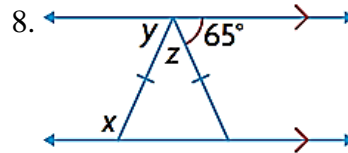
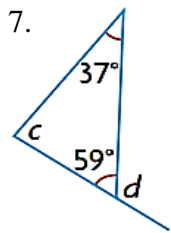
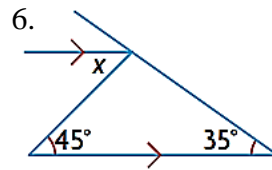
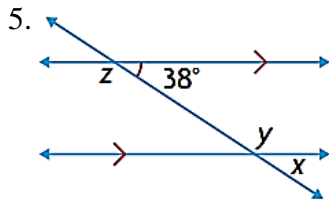
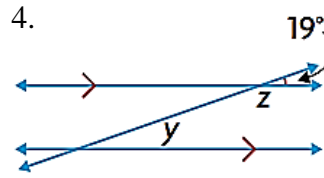
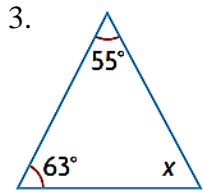
1.



2.

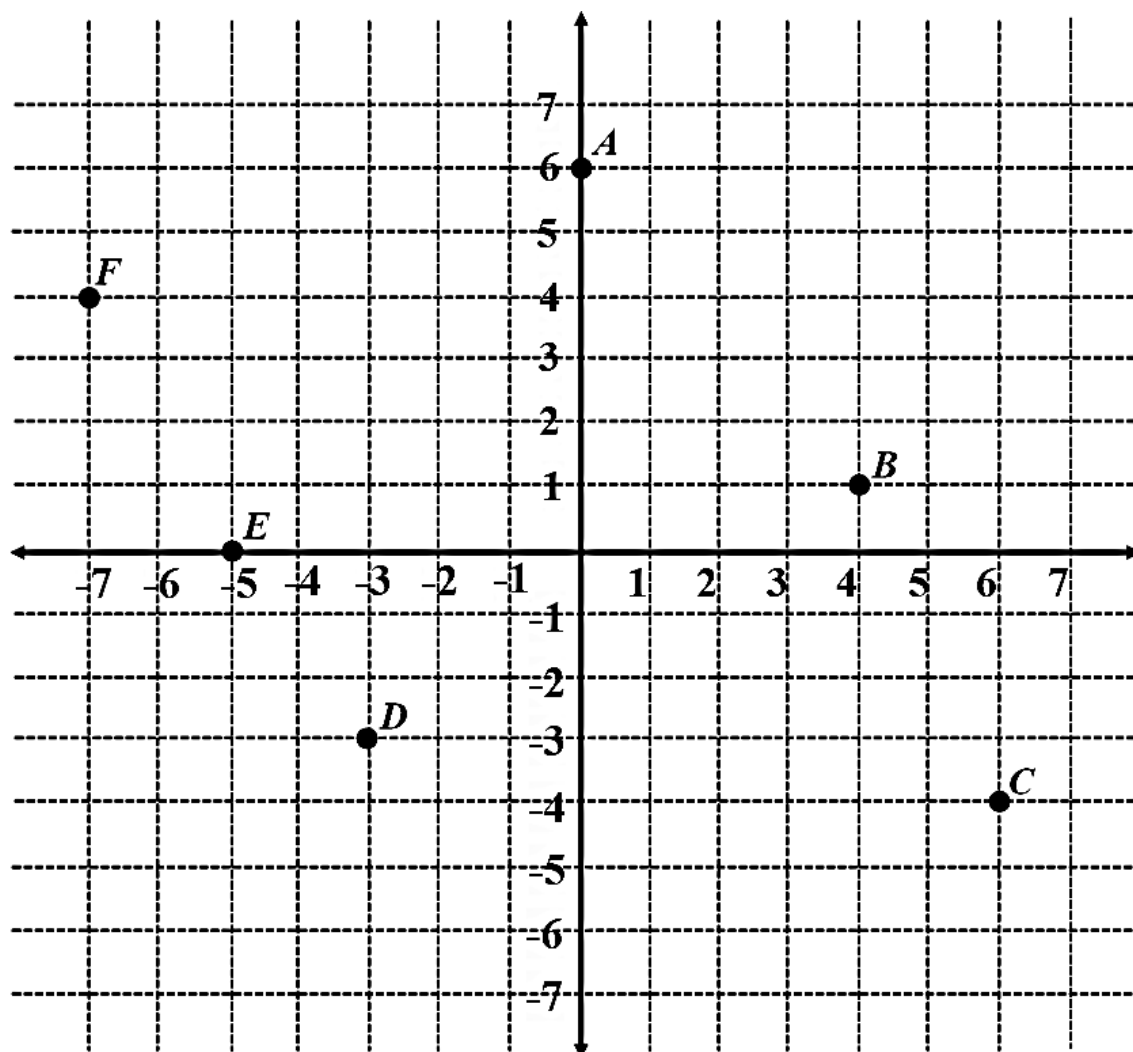


URSULA FRANKLIN ACADEMY





G – The Cartesian Plane



State the coordinates of the points shown in the graph.

*A* (     ,     )

*B* (     ,     )

*C* (     ,     )

*D* (     ,     )

*E* (     ,     )

*F* (     ,     )

Sketch and label the points on the graph above

*G* ( 2 , 4 )

*H* ( 0 , 0 )

*I* ( -3 , 5 )

*J* ( 6 , 0 )

*K* ( -7 , -7 )

*L* ( 4 , -6 )

**H – Linear Relationships**

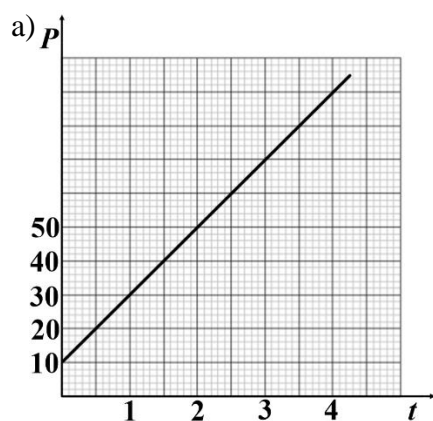
1. Does the given scenario represent a linear relationship? Justify your answer.

a) Soula walks at a constant speed of 9 km/h.

b) The height of a ball is measured every second after it is dropped from a roof.

c)  $H = 100 - 4t$

2. Write an equation to represent each linear relationship.



b)

$x$	$y$
0	20
3	35
6	50
9	65

c) The Bright Star banquet hall charges a fixed fee of \$600 to rent a hall and \$80 person for the meal. ( $C$  – total cost,  $n$  – number of guests)

3. Consider the scenario given in 2(c) above.

a) Determine the total cost for a party with 175 guests.

b) Determine the maximum number of guests you could invite if you have a spending limit of \$20000.

URSULA FRANKLIN ACADEMY

Answers:

**A – Operating with Integers**

1. 1      2. -7      3. 0      4. 24      5. -9      6. -4      7. -12  
8. 12      9. -8      10. 4      11. 1      12. 25      13. -16      14. 27  
15. -100

**B – Order of Operations**

1. 17      2. -12      3. 0      4. -2      5. 3      6. 33      7. 6      8. 4

**C – Operating with Fractions**

1. a)  $\frac{1}{7}$       b)  $\frac{3}{4}$       c)  $\frac{13}{15}$       d)  $\frac{2}{3}$   
2. a)  $\frac{7}{11}$       b)  $\frac{1}{3}$       c)  $\frac{2}{3}$       d)  $-\frac{4}{9}$       e)  $\frac{11}{12}$       f)  $-\frac{37}{42}$       g)  $\frac{17}{30}$   
h)  $\frac{11}{24}$       i)  $\frac{19}{50}$       j)  $\frac{1}{12}$       k)  $\frac{8}{15}$       l)  $\frac{20}{21}$       m)  $\frac{4}{27}$       n)  $\frac{3}{10}$       o)  $\frac{4}{7}$

**D – Variables and Equations**

1. a)  $2x$       b)  $x^2$       c)  $x^5$       d)  $11x$       e)  $7x$       f) 0  
2. a) 4      b) -2      c) -5      d) 11  
3. a) 19      b) 53      c) -3      d) 6      e) -30      f) 7      g) 16  
h) 10      i) -11      j) 8      k)  $\frac{5}{3}$       l)  $\frac{20}{3}$

**E – Ratios, Rates and Percentages**

1. a) 18 goldfish      b) 88 koi      c) 36 koi, 27 goldfish      d) 42.9 %  
2. a) 133.3 m/min      b) 0.22 \$/pound      c) 17.50 \$/h  
3. 20 l for \$18.40      4. 204.5 g of sugar      5. 352 children, 198 adults      6. \$57.84      7. \$17.25

**F – Angles**

1.  $x = 79^\circ$       2.  $x = 130^\circ$       3.  $x = 62^\circ$       4.  $y = 19^\circ, z = 161^\circ$       5.  $x = 38^\circ, y = 142^\circ, z = 142^\circ$   
6.  $x = 45^\circ$       7.  $c = 84^\circ, d = 121^\circ$       8.  $x = 115^\circ, y = 65^\circ, z = 50^\circ$       9.  $x = 150^\circ$       10.  $x = 20^\circ$

**G – The Cartesian Plane**

- A(0,6)      B(4,1)      C(6,-4)      D(-3,-3)      E(-5,0)      F(-7,4)

**H – Linear Relationships**

1. a) Yes      b) No      c) Yes  
2. a)  $P = 10 + 20t$       b)  $y = 20 + 5x$       c)  $C = 600 + 80n$   
3. a) \$ 14600      b) 242 guests