10C FINAL EXAM REVIEW PACKAGE

UNIT 1: FACTORS AND PRODUCTS

1. Expand and simplify:
   a) $(x-4)(x+9)$ b) $(x+3)^2$ c) $(3x+4)(2x-7)$
   d) $(x-6)(x+6)$ e) $(x-3)^3$ f) $(4x+5)(3x^2-7x-3)-(8x+1)(x-5)$

2. Factor completely:
   a) $x^2-29x+100$ b) $2x^2-6x-80$ c) $9x^2+3x-20$
   d) $4x^2-4x-35$ e) $-2x^2-30x-108$ f) a^4-1
   g) $36x^2-64y^2$ h) $12x^2-31xy+20y^2$ i) $8x^2+20x-2x-5$

3. Which expression(s) have a factor of $(2x+3)$?
   $4x^2-9$
   $4x^2-4x-3$
   $2x^2+5x+3$
   $2x^2+7x+3$

4. When the dimensions of a rectangle, with area of $6x^2+7x-3$, are written in the form of $(ax-b)(cx+d)$, then $a+b+c+d$ is _____.

UNIT 2: ROOTS AND POWERS

1. Convert the mixed radicals to entire radicals:
   a) $4\sqrt{3}$ b) $3\sqrt[3]{6}$ c) $5\sqrt{7}$ d) $2\sqrt[3]{70}$

2. Simplify the following radicals:
   a) $\sqrt{96}$ b) $-3\sqrt{180}$ c) $5\sqrt[3]{288}$ d) $\sqrt[3]{1728}$
   e) $\sqrt{240}$ f) $\sqrt[3]{108}$ g) $4\sqrt{75}$ h) $-2\sqrt{176}$

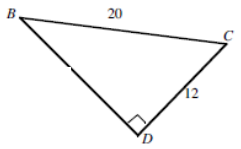
3. Write each power as a radical:
   a) $x^{\frac{1}{2}}$ b) $y^{\frac{3}{4}}$ c) $(8x)^{\frac{1}{3}}$ d) $(54a^3)^{\frac{2}{3}}$

4. Simplify:
   a) $(x^3y^6)^4$ b) $(a^5b^{-6}c)(a^{-3}b^9c^0)$ c) $\frac{(3x^3)^4}{5x^5}$
   d) $\left(\frac{-12a^2b^3}{27a^6b^2}\right)^{-2}$ e) $\frac{(4y^6)^{\frac{1}{2}}}{(6y^6z^0)^2}$

5. The expression $\frac{6(x^3y^5)^2}{(3xy)^4}$ is equivalent to the expression
   A. $\frac{4x^2y^6}{9}$
   B. $2x^5y^6$
   C. $2x^2y^6$
   D. $\frac{2x^2y^6}{27}$

UNIT 3: TRIGONOMETRY

1. Solve Δ *BCD*. Determine the measure of each angle to the nearest degree and the side lengths to the nearest tenth.



2. A support cable is anchored to the ground 5 m from the base of a telephone pole. The cable is 19 m long. The angle of elevation of the cable, to the nearest degree, is _____ degrees.

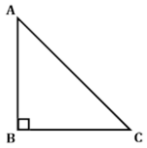
3. A submarine goes into a dive at an angle of depression of 32º and travels 275 m while making its dive. When the submarine stops its dive, what *vertical distance* has it travelled?

4. A water bomber is flying at an altitude of 5000 ft. The plane's radar shows that it is 8000 ft. from the target site. What is the angle of elevation of the plane measured from the target site, to the nearest degree?

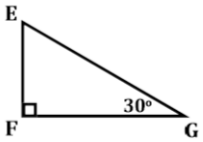
5. Susan is standing a distance of 200 m from the base of an observation tower. The angle between her and her line of sight to the top of a tower is 56º. What is the distance from Susan to the top of the tower, to the nearest meter?

6. SPECIAL TRIANGLES:

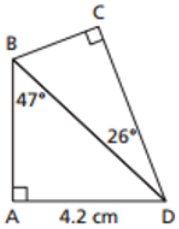
a) In triangle ABC, AB = 1 and BC = 1. Determine the exact value of AC. (Hint: use P.T.)



b) In triangle EFG, if EF=1 and EG=2, determine the exact value of FG.



7. Solve for CD.



UNIT 4: MEASUREMENT

SI Units to Imperial Units	Imperial Units to SI Units
1 mm ≐ $\frac{4}{100}$ in.	1 in. ≐ 2.5 cm
1 cm ≐ $\frac{4}{10}$ in.	1 ft. ≐ 30 cm 1 ft. ≐ 0.3 m
1 m ≐ 39 in. 1 m ≐ $3\frac{1}{4}$ ft.	1 yd. ≐ 90 cm 1 yd. ≐ 0.9 m
1 km ≐ $\frac{6}{10}$ mi.	1 mi. ≐ 1.6 km

1. After meeting in Emerson, MB, Hana drove 62 mi. south and Farrin drove 98 km north. Who drove farther, in kilometers?

2. A bowling lane is approximately 19 m long. What is this measurement to the nearest foot?

3. The surface area of a cyclinder is given by the formula $SA = 2\pi r^2 + 2\pi rh$. If a cyclinder has a diameter of 5 cm and a height of 6.1 cm, the surface area, to the nearest cm^2, is _____ .

UNIT 5: RELATIONS AND FUNCTIONS

1. Consider the relation described by the equation $y = -x - 2$.

a) Identify the independent and dependent variables.

b) Complete the following table of values.

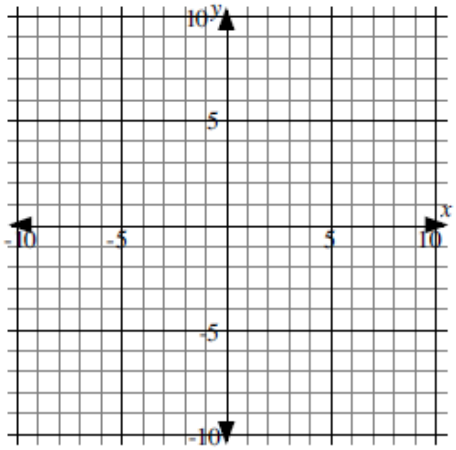
Input (x)	Output (y)	Ordered pair (x, y)
–3		
–1		
0		
1		

c) Plot the ordered pairs in b) on the grid provided.

d) Connect the points on the grid, and then extend the line in both directions with arrows at both ends.

e) Use the graph to determine the value of y when $x = 5$.

f) Use the equation to determine the value of y when $x = 5$, and verify the answer in e).



g) Write the value of y when $x = 5$ in the table of values in b).

h) Use the graph to determine the value of x when $y = 0$. Include this ordered pair in the table of values.

i) Use the graph to determine the value of x when $y = 4$. Include this ordered pair in the table of values.

j) Verify the answer in i) using the equation.

k) Is this a linear or a nonlinear relation?

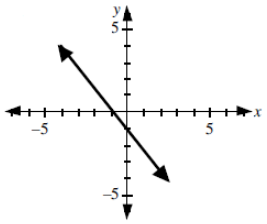
l) In set and interval notation, write the domain and range of the graph.

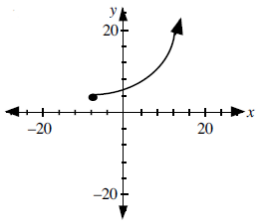
2. State the domain and range of each relation.

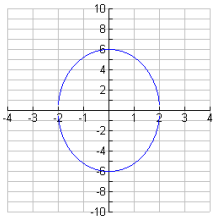
a) $(2, 3), (0, 2), (4, 8), (-1, 8), (-3, 1)$ b) $(-3, 3), (0, -5), (-3, 3), (5, -2), (-8, 1)$

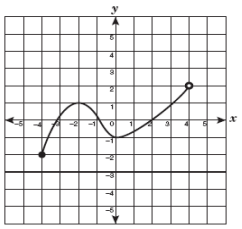
c) Determine which relation in *a* and *b* above is a function.

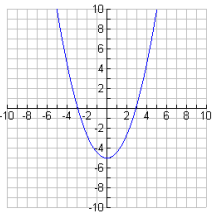
3a) State the domain and range in set and interval notation.

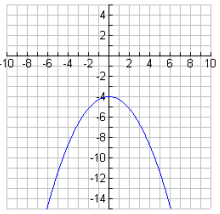


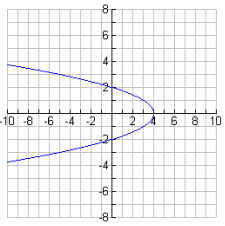












b) Circle the graphs above that are functions.

4. Function g defined by $g(x) = 6 - x^2$. Evaluate:

a) $g(4)$ **b)** $g(-6)$ **c)** $g\left(\sqrt{3}\right)$

5. If $f(x) = x^3 - 2x^2 - x - 5$, evaluate:

a) $f(5)$ **b)** $f(-3)$

6. **a)** If $f(x) = 5x - 7$, then determine the value of x if $f(x) = 43$.

b) If $g(x) = 6x + 3$, then determine the value of x if $g(x) = -24$.

c) If $g(t) = 56 - 3t$, then determine the value of t if $g(t) = 11$.

d) If $h(x) = -3x + 1$, then determine the value of x if $h(x) = 22$.

e) If $P(x) = 50 - 3x^2$, then determine the values of x if $P(x) = -25$.

7. Determine the *x* and *y-intercepts* for the following linear equations:

a) $2x + y - 6 = 0$ b) $-2y + 20 + 5x = 0$ c) $4x - 5y = 3$ d) $x^2 - 4 = y$

8. Which of the following statements is not always true for a function?

A. A function is a set of ordered pairs (x, y) in which for every x there is only one y.
B. A vertical line must not intersect the graph of a function in more than one point.
C. For every output there is only one input.
D. For every element in the domain, there is only one element in the range.

UNIT 6: LINEAR FUNCTIONS

Slope-intercept: $y = mx + b$
General: $Ax + By + C = 0$
Slope-point: $y - y_1 = m(x - x_1)$

1. Use the slope formula to calculate the slope of the line passing through the given points.

a) $(3, -6)$ and $(8, 4)$ **b)** $(-12, 7)$ and $(0, -2)$

$m = \frac{y_2 - y_1}{x_2 - x_1} =$

c) $(-3, -8)$ and $(1, 5)$ **d)** $(21, 1)$ and $(-4, -9)$

2. The slope of the line segment joining $E(5, -1)$ and $F(3, 7)$, is

A. -3
B. -4
C. $-\frac{1}{3}$
D. $-\frac{1}{4}$

3. If the line segment joining $(2, 3)$ and $(8, k)$ has slope $-\frac{2}{3}$, then $k =$

A. -1
B. -3
C. -6
D. 7

4. If P is the point $(4, 7)$ and Q is the point $(6, -2)$, find the slope of a line segment

a) parallel to line segment PQ **b)** perpendicular to line segment PQ

5. The line segment joining $U(-3, p)$ and $V(-6, 5)$ is perpendicular to the line segment joining $X(4, 2)$ and $Y(9, 0)$. The value of p, to the nearest tenth, is _____.

(Record your answer in the numerical response box from left to right)

6. Convert the following equations from slope y-intercept form $(y = mx + b)$ to general form $(Ax + By + C = 0)$, where A, B, and C are integers.

a) $y = 7x - 3$ **b)** $y = -2x + 9$ **c)** $y = mx + b$

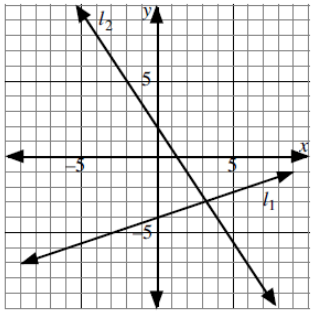
d) $y = -\frac{3}{4}x + 5$ **e)** $y = \frac{2}{3}x + \frac{1}{6}$ **f)** $y = \frac{5}{3}x - \frac{1}{4}$

7. Determine the slope and y-intercept of the graph of the following lines.

a) $x + y - 11 = 0$ **b)** $3x - 2y + 30 = 0$ **c)** $8x - 3y - 3 = 0$

d) $3x + 6y - 7 = 0$ **e)** $8y = 4x + 32$ **f)** $4x + 3y = 12$

8. Write the equation of l_1 and l_2 in slope-point, slope-intersect form and general form.



9. Determine the equation of the line which passes through the point $(0, 16)$ and is parallel the line which passes through $(1, 3)$ and $(4, -6)$.

10. Determine the equation of the line which passes through the point $(0, -1)$ and is perpendicular to the line which passes through $(7, -2)$ and $(12, -3)$.

11. Two perpendicular lines intersect on the y-axis. One line has equation $y = 4x + 6$. If the equation of the other line is $y = mx + b$, then the exact value of $m + b$ is _____.

(Record your answer in the numerical response box from left to right)

12. Write the equation, in general form, of a line perpendicular to $3x - 2y + 5 = 0$ and with the same y-intercept as $3x - y + 18 = 0$.

13. Consider the lines $x - 2y + 1 = 0$ and $4x + ky - 8 = 0$.

a) Determine the value of k if the lines have the same slope.

b) Determine the value of k if the lines have the same y-intercept.

14. Which of the following lines is/are perpendicular to the line $4x - 2y + 9 = 0$?

i) $6x + 3y - 1 = 0$ ii) $x + 2y - 12 = 0$ iii) $5x + 10y = 0$

---

15. Write the equation of a line which is perpendicular to $2x + 5y - 7 = 0$ and has the same y-intercept as $2x + y - 6 = 0$.

Answer in slope y-intercept form and in general form.

Use the following information to answer Class Ex. #6.

A student made the following statements about the line with equation $2y = 5x + 12$.

Statement 1: The line has a slope of 5.

Statement 2: The line is parallel to $10x - 4y + 13 = 0$.

Statement 3: The line passes through $(-2, 1)$.

16. Which of the above statement(s) is/are true?

A. 1 and 2 only

B. 1 and 3 only

C. 2 and 3 only

D. some other combination of statements 1, 2, and 3

17. The equation of the line passing through the point $(4, 2)$ with slope -3 is

A. $3x + y - 14 = 0$
B. $3x + y + 10 = 0$
C. $3x + y - 10 = 0$
D. $3x + y + 14 = 0$

18. Which of the following linear equations is equivalent to $y - 3 = -\frac{3}{4}(x + 7)$?

A. $3x - 4y + 33 = 0$
B. $3x + 4y + 9 = 0$
C. $3x + 4y - 33 = 0$
D. $3x + 4y + 18 = 0$

19. The equation of the line with an x-intercept of -2 and slope 12 can be written in general form $12x + By + C = 0$. The value of $B + C$ is _____.
(Record your answer in the numerical response box from left to right)

UNIT 7: SYSTEMS OF LINEAR EQUATIONS

1. A system of linear equations is made up of _____ or more equations.

2. The solution to a system of equations is _____.

3. A system of equations (2 in our case) can have _____ solution, _____ solution, or _____ _____ solutions.

4. Lines that have 1 solution are _____ lines.
Lines that have 0 solutions are _____ lines.
Lines that have infinitely many solutions are _____ lines.

5. In each of the following systems:
   - solve the system using the method of substitution
   - verify the solution satisfies both equations
   - check the solution by graphing

a) $y = x + 2, \quad 3x + 4y = 1$

b) $x - 2y = 10, \quad x + 5y + 4 = 0$

c) $4p + q = 0, \quad 7p + 4q = 3$

d) $6u - 3v + 4 = 0, \quad 3u = 3v - 5$

6. Solve each of the following systems by elimination. Check each solution.

a) $2x + 4y = 7,\ \ 4x - 3y = 3$

b) $5x = 8y,\ \ 4x - 3y + 17 = 0$

c) $7e + 4f - 1 = 0,\ \ 5e + 3f + 1 = 0$

d) $3x + 2y - 6 = 0,\ \ 9x = 5y + 18$

For each of the following questions:

a) Introduce variables to represent the unknown values.
b) Form a system of equations involving the variables.
c) Solve the system.
d) Answer the problem and check the solution.

7. A rectangle is to be drawn with perimeter 64 cm. If the length is to be 14 cm more than the width, determine the dimensions of the rectangle.

8. The difference between two numbers is 63. Four times the smaller is the same as 9 less than the larger number. Determine the two numbers.

9. To visit the Manitoba Children's Museum in Winnipeg one adult and 3 children pay $27.75. Two adults and 2 children pay $27.50. The cost of the more expensive ticket is $_____ .

10. Determine the number of solutions for each linear system.

a) $x + 2y = 6$
$x + y = -2$

b) $3x + 5y = 9$
$6x + 10y = 18$

c) $2x - 5y = 30$
$4x - 10y = 15$

KEY

UNIT 1: FACTORS AND PRODUCTS

1a) $x^2+5x-36$ b) x^2+6x+9 c) $6x^2-13x-38$ d) x^2-36 e) $x^3-9x^2+27x-27$
f) $12x^3-21x^2-8x-10$ 2a) $(x-25)(x-4)$ b) $2(x-8)(x+5)$ c) $(3x-4)(3x+5)$
d) $(2x-7)(2x+5)$ e) $-2(x+9)(x+6)$ f) $(a^2+1)(a-1)(a+1)$ g) $4(3x-4y)(3x+4y)$
h) $(3x-4y)(4x-5y)$ i) $(4x-1)(2x+5)$
3) $4x^2-9$ and $2x^2+5x+3$ 4)

9			

UNIT 2: ROOTS AND POWERS

1a) $\sqrt{48}$ b) $\sqrt[3]{162}$ c) $\sqrt{175}$ d) $\sqrt[3]{560}$ 2a) $4\sqrt{6}$ b) $-18\sqrt{5}$ c) $10\sqrt[3]{36}$ d) 12 e) $4\sqrt{15}$ f) $3\sqrt[3]{4}$
g) $20\sqrt{3}$ h) $-8\sqrt{11}$ 3a) $\sqrt{x}$ b) $\sqrt[4]{y^3}$ or $\left(\sqrt[4]{y}\right)^3$ c) $\sqrt[3]{8x} = 2\sqrt[3]{x}$ d) $\left(\sqrt[3]{54a^3}\right)^2 = \left(3a\sqrt[3]{2}\right)^2$
4a) $x^{12}y^{24}$ b) a^2b^3c c) $\frac{81x^7}{5}$ d) $\frac{81a^8}{16b^2}$ e) $\frac{1}{18y^9}$ 5) $\frac{2x^2y^6}{27}$

UNIT 3: TRIGONOMETRY

1) BD = 15.9 ∠B = 37° ∠C = 53° 2)

7	5		

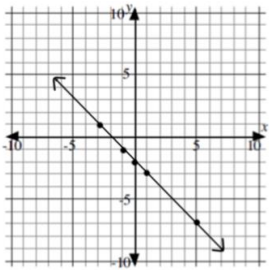
3) 145.7 m 4) 39° 5) 358 m 6a) $\sqrt{2}$ b) $\sqrt{3}$
7) BD = 5.742….. CD = 5.2 cm

UNIT 4: MEASUREMENT

1) Hanna drove 99.2 km 2) 61.75 = 62 ft. 3) 135 cm

UNIT 5: RELATIONS AND FUNCTIONS

1a-d)



e-f) $y=7$ g) $(5,-7)$ h) $x=-2$ i-j) $x=-6$ k) linear

l) D: $\{x|x\in R\}$ D: $(-\infty,\infty)$
R: $\{y|y\in R\}$ R: $(-\infty,\infty)$

2a) D: $\{-3,-1,0,2,4\}$ R: $\{1,2,3,8\}$ b) D: $\{-8,-3,0,5\}$ R: $\{-5,-2,1,3\}$ c) *a* is a function; *x-values* not repeated

3a) D: $\{x|x\in R\}$ $(-\infty,\infty)$ | D: $\{x|x\geq -8; x\in R\}$ $[-8,\infty)$ | D: $\{x|-2\leq x\leq 2; x\in R\}$ $[-2,2]$
R: $\{y|y\in R\}$ $(-\infty,\infty)$ | R: $\{y|y\geq 4; x\in R\}$ $[4,\infty)$ | R: $\{y|-6\leq y\leq 6; y\in R\}$ $[-6,6]$

D: $\{x|-4\leq x<4; x\in R\}$ $[-4,4)$ | D: $\{x|x\in R\}$ $(-\infty,\infty)$ | D: $\{x|x\in R\}$ $(-\infty,\infty)$
R: $\{y|-2\leq y<2; y\in R\}$ $[-2,2)$ | R: $\{y|y\geq -5; y\in R\}$ $[-5,\infty)$ | R: $\{y|y\leq -4; y\in R\}$ $(-\infty,-4]$

D: $\{x|x\leq 4; x\in R\}$ $(-\infty,4]$ b) Functions: Graphs 1, 2, 4, 5, 6
R: $\{y|y\in R\}$ $(-\infty,\infty)$

4a) $g(4)=-10$ b) $g(-6)=-30$ c) $g(\sqrt{3})=3$ 5a) $f(5)=65$ b) $f(-3)=-47$ 6a) $x=10$ b) $x=-\frac{9}{2}$
c) $t=15$ d) $x=-7$ e) $x=5,-5$ 7a) *x-int*: 3 b) *x-int*: -4 c) *x-int*: $\frac{3}{4}$ d) *x-int*: $2,-2$
y-int: 6 *y-int:* 10 *y-int:* $-\frac{3}{5}$ *y-int:* -4

8. C

UNIT 6: LINEAR FUNCTIONS

1a) $m = 2$ b) $m = -\frac{3}{4}$ c) $m = \frac{13}{4}$ d) $m = \frac{2}{5}$ 2) B 3) A 4a) $m = -\frac{9}{2}$ b) $m = \frac{2}{9}$ 5)

1	2	.	5

6a) $0 = 7x - y - 3$ b) $2x + y - 9 = 0$ c) $0 = mx - y + b$ d) $0 = 3x + 4y - 20$
e) $0 = 4x - 6y + 1$ f) $0 = 20x - 12y - 3$ 7a) $y = -x + 11;\ \ m = -1, y - int = 11$
b) $y = \frac{3}{2}x + 15;\ \ m = \frac{3}{2}, y - int = 15$ c) $y = \frac{8}{3}x - 1;\ \ m = \frac{8}{3}, y - int = -1$ d) $y = -\frac{1}{2}x + \frac{7}{6};\ \ m = -\frac{1}{2}$, $y - int = \frac{7}{6}$ e) $y = \frac{1}{2}x + 4;\ \ m = \frac{1}{2}, y - int = 4$ f) $y = -\frac{4}{3}x + 4;\ \ m = -\frac{4}{3}, y - int = 4$

8) ***l₁***: $m = \frac{1}{3}, y - int = -4\ \ (0, -4)$ $y + 4 = \frac{1}{3}(x - 0;$ $y = \frac{1}{3}x - 4;$ $0 = x - 3y - 12$

l₂: $m = -\frac{3}{2}, y - int = 2\ \ (0,2)$ $y - 2 = -\frac{3}{2}(x - 0);$ $y = -\frac{3}{2}x + 2$ $0 = 3x + 2y - 4$

9) $y = -3x + 16$ 10) $y = 5x - 1$ 11)

5	.	7	5

12) $0 = 2x + 3y - 54$ 13a) $k = -8$
b) $k = 16$ 14) ii,iii 15) $y = \frac{5}{2}x + 6$ $0 = 5x - 2y + 12$ 16) C 17) A 18) B 19)

2	3		

UNIT 7: SYSTEMS OF LINEAR EQUATIONS

1) 2 2) the point of intersection (x,y) 3) 0, 1, infinitely many 4) intersecting, parallel, coincidental
5a) $x = -1,\ y = 1$ b) $x = 6,\ y = -2$ c) $p = -\frac{1}{3},\ q = \frac{4}{3}$ d) $u = \frac{1}{3},\ v = 2$ 6a) $x = \frac{3}{2},\ y = 1$
b) $x = -8,\ y = -5$ c) $e = 7,\ f = 12$ d) $x = 2,\ y = 0$ 7) $width = 9\ cm,\ length = 23\ cm$
8) $smaller = 18,\ larger = 81$ 9)

7			

10a) different slopes so only *1 solution* b) same slopes and y-intercepts so *infinitely many solutions*
c) same slopes but different y-intercepts so *no solution*