Answer Key

Measurement Lesson One: Metric and Imperial

Introduction

a)

Unit	Length	Referent
mm	1/1000 m	thickness of a dime
cm	1/100 m	width of a paperclip
dm	1/10 m	length of a crayon
m	1 m	floor to doorknob
dam	10 m	width of a house
hm	100 m	football field
km	1000 m	walking 15 minutes

b) i. 30 cm ruler, ii. Trundle Wheel, iii. Tape Measure iv. Vernier Calipers, v. Trundle Wheel, vi. Vernier Calipers, vii. Tape Measure

c)

Unit	Imp. to Imp.	Imp. to Metric	Referent
inch	------	1 in. ≈ 2.54 cm	middle thumb joint to tip of thumb.
foot	1 ft. = 12"	1 ft. ≈ 30.48 cm	about the same as a 30 cm ruler.
yard	1 yd. = 3 ft.	1 yd. ≈ 0.9144 m	a little bit shorter than a 1 m ruler.
mile	1 mi. = 1760 yd.	1 mi. ≈ 1.609 km	distance walked in 20 minutes.

d) Requires conversion table, ineffective for small measurements, and mixing measurement systems can lead to accidents.

e) America is Canada's largest trading partner, so imperial units are often encountered in the workplace *(and consumer goods)*.

Example 1: a) 12.57 cm b) 19 cm c) 787 km • **Example 2:** a) 3.56 cm b) 0.70 cm c) 4.98 cm d) 1.52 cm

Example 3: a) 0.007 km b) 0.12 m c) 0.000453 km d) 3000 m e) 800 cm f) 70 000 cm

Example 4: a) 1.22 mm b) 2.1 m c) 149 km • **Example 5:** a) 141.37 cm, b) 495.15 rotations

Example 6: a) 2 1/2 in. b) 3/4 in. c) 2 3/8 in. d) 3 15/16 in. e) 1 9/16 in. • **Example 7:** a) 0.23 m b) 5000 mm c) 0.00398 mi. d) 372 in.

Example 8: a) 15 ft. b) 17 600 yd. c) 240 in. d) 67 in. e) 144 in. f) 10 560 ft.

Example 9: a) 26 yd. b) 0.0625 mi. c) 4 ft. d) 4.83' e) 30 yd. f) 2.27 mi.

Example 10: a) 5.49 m b) 4.83 km c) 2.03 m d) 1.16 m e) 1.60 m f) 643.60 m

Example 11: a) 15.31 yd. b) 4.35 mi. c) 472.44 in. d) 2188 yd. e) 2.36 ft. f) 0.25 mi. • **Example 12:** a) 17 m, b) 11" c) 120 cm d) 13 yd.

Example 13: a) Don 1.37 m, Elisha 1.6 m, Brittney 1.63 m, Calvin 1.65 m, Andrew 1.76 m b) No. The maximum height is 2.59 m.

Example 14: a) 195 pieces of sod are required to cover the lawn b) The cost of the linoleum is $2329.21.

Measurement Lesson Two: Surface Area and Volume

Introduction: a) SA = 804 cm^2, V = 2145 cm^3 b) SA = 342 in^2, V = 324 in^3 c) SA = 176 cm^2, 123 cm^3
d) SA = 488 cm^2, V = 512 cm^3 e) SA = 534 ft^2, V = 942 ft^3 f) SA = 578 m^2, V = 924 m^3

Example 1: a) i. r = 19 cm, ii. r = 19 cm b) i. s = 11 m, ii. h = 9 m • **Example 2:** a) SA = 99 ft^2 b) h = 15 m

Example 3: SA = 479 cm^2, V = 905 cm^3 • **Example 4:** SA = 1949 cm^2, V = 2933 cm^3 • **Example 5:** SA = 6542 mm^2, V = 20 858 mm^3

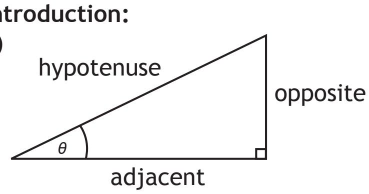
Example 6: SA = 2065 cm^2, V = 6000 cm^3 • **Example 7:** SA = 3047 m^2, V = 9019 m^3

Measurement Lesson Three: Trigonometry I

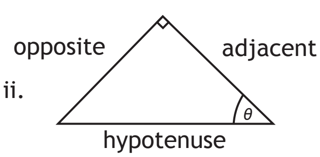
Introduction:

a)

i.



ii.



b) Each ratio is 0.5
c) tan θ = opposite/adjacent
d) Each ratio is 0.4
e) sin θ = opposite/hypotenuse
f) Each ratio is 0.75
g) cos θ = adjacent/hypotenuse
h) SOH CAH TOA

Example 1: a) sin θ = 0.8 cos θ = 0.6 tan θ = 1.3 b) sin θ = 0.7241 cos θ = 0.6897 tan θ = 1.05
c) sin θ = 0.9692 cos θ = 0.2462 tan θ = 3.9375 d) sin θ = 0.9231 cos θ = 0.3846 tan θ = 2.4

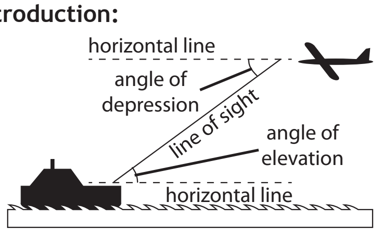
Example 2: a) θ = 40° b) θ = 73° c) θ = 16.26° d) θ = 47° • **Example 3:** a) hypotenuse = 25 cm b) opposite = 55 cm

Example 4: a) x = 53 cm, y = 46 cm, m = 49° b) y = 3 cm, h = 24 cm, m = 82°
c) h = 24 cm, m = 44°, n = 46° d) x = 18 cm, m = 39.5°, n = 50.5° • **Example 5:** a) 83 m b) 14 ft.

Measurement Lesson Four: Trigonometry II

Introduction:

a)



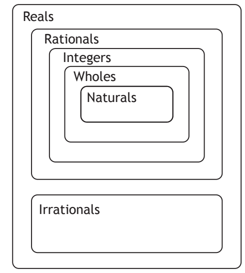
b) 30° c) 5196 m

Example 1: a) 17.9 cm b) 14.5 cm c) 2.5 cm
Example 2: a) 3.5 cm b) 6.6 cm c) 18.5 cm
Example 3: a) 45.6° b) 1.2° c) 22.7°
Example 4: a) 158.4 m
b) clinometer for angles, trundle wheel for distance
c) direct measurements are obtained using an instrument, while indirect measurements are found with math.
The angles of elevation and depression, and the distance between the buildings are direct measurements.
The height of the building is an indirect measurement.

Example 5: 1.9 m
Example 6: 59 m

Answer Key

Numbers, Radicals, and Exponents Lesson One: Number Sets



Introduction: a) The set of natural numbers (N) can be thought of as the counting numbers.
b) The whole numbers (W) include all of the natural numbers plus one additional number - zero.
c) The set of integers (I) includes negative numbers, zero, and positive numbers.
d) The set of rational numbers (Q) includes all integers, plus terminating and repeating decimals.
e) Irrational numbers ($\overline{Q}$) are non-terminating and non-repeating decimals.
f) Real numbers (R) includes all natural numbers, whole numbers, integers, rationals, and irrationals.

Example 1: a) I, Q, R b) W, I, Q, R c) $\overline{Q}$, R d) N W I Q R e) Q R f) Q R g) Q R h) $\overline{Q}$ R

Example 2: a) true b) false c) true d) false e) false

Example 3: Rational: $\frac{1}{4}$ $\sqrt[3]{8}$ 0 $\sqrt[5]{-0.03125}$ $27^{\frac{1}{3}}$ $\sqrt{49}$ 5 $\frac{0}{3}$ Irrational: $-\sqrt{2}$ $-\sqrt{\frac{3}{5}}$ $\sqrt{0.13}$ Neither: $\frac{3}{0}$ $\sqrt{-2}$ $(-2)^{\frac{1}{2}}$

Example 4: a) $-0.\overline{75}$ $-\frac{1}{3}$ $-\frac{1}{4}$ $1.3572...$ b) $-2\sqrt{2}$ $\sqrt[3]{-6}$ $-\sqrt{3}$ $\sqrt{\frac{4}{5}}$ $\sqrt[4]{5}$ $2\sqrt[3]{2}$ $\sqrt{8}$ c) -2^2 $(-32)^{\frac{1}{5}}$ $(-3)^{\frac{1}{3}}$ 4^{-1} $2^{\frac{1}{2}}$ $(-2)^2$

Numbers, Radicals, and Exponents Lesson Two: Primes, LCM, and GCF

Introduction: a) A prime number is a natural number that has exactly two distinct natural number factors: 1 and itself.
b) A composite number is a natural number that has a positive factor other than one or itself.
c) 0 is not a prime number because it has infinite factors. 1 is not a prime number because it has only one factor - itself.
d) Prime Factorization is the process of breaking a composite number into its primes. $12 = 2 \times 2 \times 3$
e) The LCM is the smallest number that is a multiple of two given numbers. LCM of 9 & 12 is 36.
f) The GCF is the largest natural number that will divide two given numbers without a remainder. GCF of 16 & 24 is 8.

Example 1: a) neither b) composite c) prime d) neither • **Example 2:** a) 24 b) 14 c) 720 d) 504 • **Example 3:** a) 6 b) 13 c) 26 d) 27

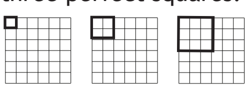
Example 4: a) 60 cm b) 12 minutes c) 252 cm

Example 5: a) 5 baskets, with 3 oranges and 2 apples in each. b) 4 groups, with 5 loonies and 2 toonies in each. c) cube edge = 13 mm

Numbers, Radicals, and Exponents Lesson Three: Squares, Cubes, and Roots

Introduction:

a) A perfect square is a number that can be expressed as the product of two equal factors.
First three perfect squares: 1, 4, 9

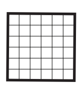


b) A perfect cube is a number that can be expressed as the product of three equal factors.
First three perfect cubes: 1, 8, 27

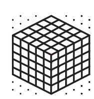
c)

Number	Perfect Square	Perfect Cube
1	$1^2 = 1$	$1^3 = 1$
2	$2^2 = 4$	$2^3 = 8$
3	$3^2 = 9$	$3^3 = 27$
4	$4^2 = 16$	$4^3 = 64$
5	$5^2 = 25$	$5^3 = 125$
6	$6^2 = 36$	$6^3 = 216$
7	$7^2 = 49$	$7^3 = 343$
8	$8^2 = 64$	$8^3 = 512$
9	$9^2 = 81$	$9^3 = 729$
10	$10^2 = 100$	$10^3 = 1000$

d) A square root is one of two equal factors of a number.
The square root of 36 is 6.



e) A cube root is one of three equal factors of a number.
The cube root of 125 is 5.



Example 1: a) 9 b) 9 c) -9 d) 27 e) -27 f) -27 • **Example 2:** a) 16 b) -32 c) -24 d) 1/64 e) 1/12 f) 10

Example 3: a) 2.8284... b) error c) 2 d) -2 e) error, -1.5157...
The odd root of a negative number can be calculated, but the even root of a negative number is not calculable.

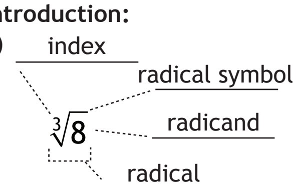
• **Example 4:** a) 20 b) 1/3 c) -1/4 d) 7/10
Example 5: a) 26.2 km b) 29.5 km
Example 6: a) 3054 cm^3 b) 10.61 cm

Example 7: a) 2.7 s b) 1.4 m • **Example 8:** a) 20.28 m b) 160 962 000 kg c) 8.7 trillion dollars

Numbers, Radicals, and Exponents Lesson Four: Radicals

Introduction:

a)



b) the index is 2

c) an entire radical does not have a coefficient, but a mixed radical does.

d) Yes. Radicals can be represented with fractional exponents.

Example 1: a) $2\sqrt{5}$ b) $4\sqrt{2}$ c) $2\sqrt[3]{2}$

Example 2: a) $2\sqrt{6}$ b) $6\sqrt{2}$ c) 7 d) $3\sqrt[3]{3}$ e) 4 f) $2\sqrt[4]{3}$

Example 3: a) $\sqrt{27}$ b) $\sqrt{72}$ c) $\sqrt[3]{40}$

Example 4: a) $\sqrt{32}$ b) $\sqrt{75}$ c) $\sqrt[3]{81}$ d) $\sqrt[4]{48}$

Example 5: a) $\sqrt{8}$ $\sqrt{14}$ $\sqrt{20}$ $\sqrt{42}$ b) $\sqrt[3]{35}$ $\sqrt[3]{54}$ $\sqrt[3]{92}$ $\sqrt[3]{169}$

Example 6: a) $\sqrt{3}$ b) 1 / 4 c) $3\sqrt{2}$ d) 7 / 9 e) $3\sqrt[3]{9}$ / 4

Example 7: a) $\sqrt{3}$ b) $\sqrt[3]{-4}$ c) $\sqrt[3]{2^4}$ or $\left(\sqrt[3]{2}\right)^4$

d) $\sqrt[5]{(-7)^2}$ or $\left(\sqrt[5]{(-7)}\right)^2$ e) $\sqrt{\left(\frac{2}{3}\right)^3}$ or $\left(\sqrt{\frac{2}{3}}\right)^3$ f) $\sqrt[4]{16}$

Example 8: a) $5^{\frac{1}{2}}$ b) $9^{\frac{1}{4}}$ c) $2^{\frac{2}{3}}$ d) $(-3)^{\frac{4}{5}}$ e) $\left(\frac{5}{7}\right)^{\frac{2}{3}}$ f) $\frac{3}{4}$

Answer Key

Numbers, Radicals, and Exponents Lesson Five: Exponents I

Introduction:

a) 2^7, $\left(\frac{3}{4}\right)^7$, $a^m \times a^n = a^{m+n}$

b) $(-6)^3$, 7^2, $a^m \div a^n = a^{m-n}$

c) 2^{15}, $(-3)^8$, $\left(a^m\right)^n = a^{mn}$

d) a^8b^{15}, $256a^{12}b^8$, $\left(a^mb^n\right)^p = a^{mp}b^{np}$

e) $\frac{a^9}{b^{15}}$, $\frac{8a^{18}}{27b^{12}}$, $\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$

f) 1, 1, $a^0 = 1$

Example 1: a) 128 b) 27 c) $\frac{8a^6}{b^3}$ d) 3^6 e) 7^3 f) $27a^6$

Example 2: a) $15a^2b$ b) $16ab^2$ c) $-21a^3b^{11}$ d) $6ab$ e) $\frac{2a^2b}{3c}$ f) 6

Example 3: a) $9a^4b^6$ b) $\frac{16a^2}{25b^2}$ c) $\frac{64a^3b^6}{125}$ d) 1 e) $-\frac{a^2}{2b^2}$ f) a^4

Example 4: a) 5 b) 3 c) 2 d) 7

Numbers, Radicals, and Exponents Lesson Six: Exponents II

Introduction:

a) $\frac{1}{3^5}$, $\frac{1}{(-12)^4}$, 7^2, $\left(\frac{2}{3}\right)^5$, $a^{-m} = \frac{1}{a^m}$

b) $\sqrt{6}$, $\sqrt[3]{-5}$, $\sqrt[5]{3^4}$ or $\left(\sqrt[5]{3}\right)^4$, $7^{\frac{5}{2}}$, $a^{\frac{m}{n}} = \sqrt[n]{a^m}$ or $\left(\sqrt[n]{a}\right)^m$

Example 1: a) $\frac{1}{16}$ b) $\frac{8}{27}$ c) $\frac{c^3}{a^2b}$ d) $\frac{1}{9a^6}$ e) 225 f) 10

Example 2: a) $\frac{8}{25}$ b) $\frac{1}{8a^4}$ c) $32a^5$ d) $\frac{1}{a^3}$ e) $\frac{1}{a^9b^3}$ f) $\frac{1}{5^{\frac{3}{2}}a^{\frac{5}{2}}}$

Example 3: a) $\frac{2a}{bc^2}$ b) $\frac{-1}{4a^{11}b^8}$ c) $\frac{125a^9b^3}{8}$ d) $\frac{4b^4}{a^2}$

Example 4: a) $\left(\sqrt{a}\right)^9$ b) $9\sqrt[3]{a}$ c) $\frac{64a^3}{27b^6}$ d) $\frac{1}{\left(\sqrt[12]{2}\right)^{31}}$

Example 5: a) $\frac{-5\left(\sqrt{b}\right)^3}{\left(\sqrt[3]{a}\right)^5}$ b) 6 c) $\frac{1}{64}$ d) 3

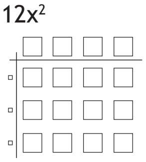
Example 6: a) $-a^{\frac{3}{2}}$ b) $a^{\frac{1}{4}}$ c) $a^{\frac{1}{6}}$ d) $2ab^2$

Example 7: a) 10 000 bacteria b) 20 000 bacteria c) 2500 bacteria ● **Example 8:** a) 69 g b) 44 g c) 30%

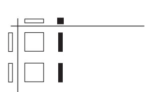
Polynomials Lesson One: Expanding Polynomials

Introduction:

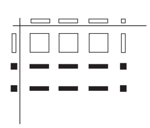
a) $12x^2$



b) $2x^2 - 2x$



c) $3x^2 - 5x - 2$



Example 1: a) $6x^2$ b) $35x^2$ c) $18a^2b$ d) $16x^2$ e) $30x^2$

Example 2: a) $-6x^2 + 2x$ b) $-8a^2 + 8a^2b$ c) $x^4 - 4x^2$ d) $18x^3 - 9x^2$

Example 3: a) $x^2 + 3x + 2$ b) $2x^2 + 5x - 12$
c) $9x^2 - 12x + 4$ d) $16x^2 - 12x - 10$

Example 4: a) $25x^2 - 64$ b) $-6x^2 + 7x - 2$ c) $2x^2 - 5xy - 3y^2$ d) $12x^3 + 60x^2 + 75x$ ● **Example 5:** a) $12x^2 - 13xy + 3y^2 + 8x - 6y$ b) $8x^3 - 36x^2 + 54x - 27$ c) $18x^3 - 3x^2 - 4x + 1$ d) $6x^4 - 3x^3 - 2x^2 + 5x - 2$

Example 6: a) $-x + 1$ b) $8x^2 - 15x + 13$ c) $-5x^2 + 18x - 15$ d) $-13x^2 + 5xy + 2y^2$ ● **Example 7:** a) $6x^2 - 10x + 4$ b) $12x^2 - 3\pi x^2$

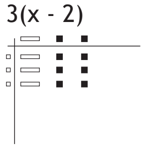
Example 8: a) $l = 50 - 2x$, $w = 25 - 2x$ b) $A = 4x^2 - 150x + 1250$ c) $V = 4x^3 - 150x^2 + 1250x$ d) $V = 2508$ cm^3

Example 9: a) $l = 32 - 2x$, $w = 27 - 2x$ b) $A = 4x^2 - 118x + 864$ c) $A = -4x^2 + 118x + 108$

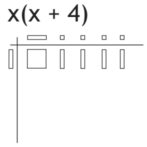
Polynomials Lesson Two: Greatest Common Factor

Introduction:

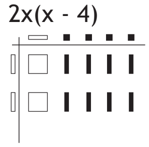
a) 3(x - 2)



b) x(x + 4)



c) 2x(x - 4)



Example 1: a) 12 b) 15 c) 8x d) $3a^2b^3$ e) πr

Example 2: a) 3(x - 4) b) -4x(x - 6) c) $15x^2(x^2 + 4)$ d) $-3x(4x^2 + 9)$

Example 3: a) $a^2(b - c + d)$ b) 6xy(xy + 3) c) $-13b(abc^3 - 3c^2 + 2ab^3)$ d) $-xy^2(y + x)$

Example 4: a) (x - 1)(3x + 4) b) (2x + 3)(4x - 1)
c) (x - 3)(5a - 3) d) $(x^2 + 1)(4x^2 - 3)$

Example 5: a) h = -5t(t - 3) b) h = 10 m

Example 6: a) SA = πr(r + 2h + s) b) 32.2 cm^2

Example 7: a) Nine baskets can be made.
Each basket will have 5 boxes of spaghetti,
3 cans of beans, and 4 bags of rice.

Answer Key

Polynomials Lesson Three: Factoring Trinomials

Introduction:

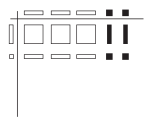
a) 1058

	40	6
20	800	120
3	120	18

b) $3x^2 + x - 2$

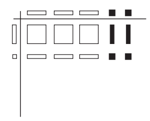
	3x	-2
x	$3x^2$	-2x
1	3x	-2

c) $3x^2 + x - 2$



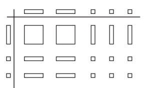
d) Each quadrant is either positive or negative. As such, it may contain only one tile color.

e) (x + 1)(3x - 2)

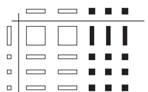


Example 1:

a) (2x + 3)(x + 2)



b) (2x - 3)(x + 3)



c) We can't place all of the tiles, so this expression is not factorable.

Example 2: a) (x + 2)(2x + 3) b) (x + 3)(2x- 3) c) not factorable

Example 3: a) (x - 6)(x - 2) b) (x + 4)(x - 5)

Example 4: a) -2a(a + 3)(a - 1) b) (xy - 3)(xy - 2)

Example 5: a) (2a- 3)(5a - 1) b) $6(2x - 3)^2$

Example 6: a) -3(x - 4)(2x + 1) b) 2(a - 2b)(4a + 3b)

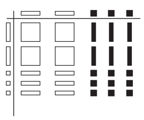
Example 7 *(answers may vary)*: a) -29, 29, -13 b) 3, 4, -5 c) -11, 5, 4

Example 8: a) (x + 3)(2x - 3) b) 4x(x - 9)(x - 1)

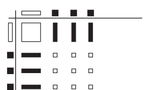
Polynomials Lesson Four: Special Polynomials

Introduction:

a) (2x + 3)(2x - 3)

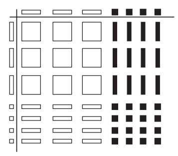


b) $(x - 3)^2$

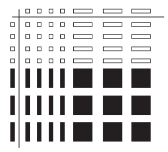


Example 1:

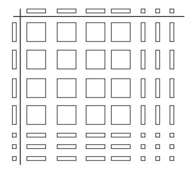
a) (3x + 4)(3x - 4)



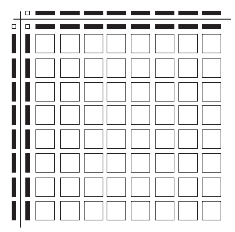
b) (4 - 3x)(4 + 3x)



c) $(4x + 3)^2$



d) $(1 - 8x)^2$



Example 2: a) (3x - 4)(3x + 4) b) (4 - 3x)(4 + 3x) c) $(4x + 3)^2$ d) $(1 - 8x)^2$

Example 3: a) (3x - 4)(3x + 4) b) (4 - 3x)(4 + 3x) c) $(4x + 3)^2$ d) $(1 - 8x)^2$

Example 4: a) not factorable b) not factorable

Example 5: a) x(3 - 2x)(3 + 2x) b) $4(x^2 + 4)$ c) $2(x - 2)(x + 2)(x^2 + 4)$ d) $(4x + y)^2$ e) $(3x^2 - 4)^2$

Example 6: a) 42 b) 1 c) 64

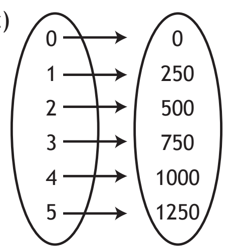
Relations and Functions Lesson One: Graphing Relations

Introduction:

a) Caitlin bikes 250 metres for every minute she travels.

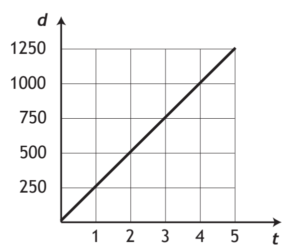
b) {(0, 0), (1, 250), (2, 500), (3, 750), (4, 1000), (5, 1250)}

c)



d) d = 250t

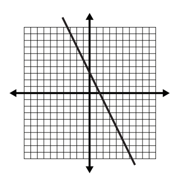
e)



Example 1:

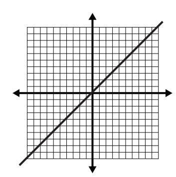
a)

x	y
-2	7
-1	5
0	3
1	1
2	-1



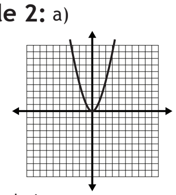
b)

x	y
-2	-2
-1	-1
0	0
1	1
2	2



Example 2: a)

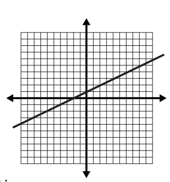
x	y
-2	4
-1	1
0	0
1	1
2	4



non-linear relation

b)

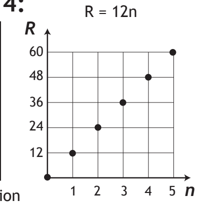
x	y
-4	-1
-2	0
0	1
2	2
4	3



linear relation

Example 4:

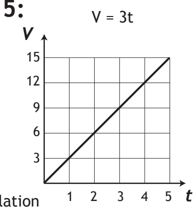
n	R
0	0
1	12
2	24
3	36
4	48
5	60



discrete relation

Example 5:

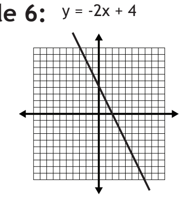
t	V
0	0
1	3
2	6
3	9
4	12
5	15



continuous relation

Example 6: y = -2x + 4

x	y
-2	8
-1	6
0	4
1	2
2	0



continuous relation

Example 3:

a) dependent variable: *R*, independent variable: *n*, rate: $3/box, equation: *R* = 3*n*

b) dependent variable: *d*, independent variable: *t*, rate: 9 m/s, equation: *d* = 9*t*

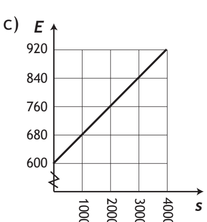
c) dependent variable: *P*, independent variable: *d*, rate: 10 kPa/m, equation: *P* = 10*d*

Example 7: a) E = 0.08s + 600

b)

s	E
0	600
1	680
2	760
3	840
4	920

c)



d) linear

e) continuous

f) earnings is dependent, sales is independent.

g) $1 096

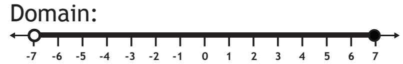
h) $12 000

Answer Key

Relations and Functions Lesson Two: Domain and Range

Introduction:

a)
Domain: All real numbers between -4 and 0, but not including -4.
Range: All real numbers between -1 and 8, but not including -1.

b)
Domain:

Range:


c) Domain: {x|-4 ≤ x <3, x ε R}
Range: {y|-6 ≤ y < 2, y ε R}

d) Domain: {3, 7, 8}
Range: {-2, 0, 9}

e) Domain: (-∞, ∞)
Range: [-2, 1]

Example 1: a) {-5, -1, 4, 9} b) {n|n≥-3, nεR} c) {n|n<-1, nεR} d) {n|1<n<6, nεR} e) {n|-7<n≤3, nεR}

Example 2: a) {-5,-4,-3,-2,-1,0,1}, {-9,-6,-3,0,3,6,9} b) {-10,-8,-6,-4,-2,0,2,4,6,8,10}, {2} • **Example 3:** a) xεR, yεR b) x=6, yεR

Example 4: a) x > -4, y < -2 b) -6 < x ≤ 5, -4 < y ≤ 0 • **Example 5:** a) x ε R, y ≥ -3 b) -2 ≤ x ≤ 6, -2 ≤ y ≤ 6

Example 6: ***Sentence:*** The domain is between 0 and 6, and the range is between 1 and 25. ***Set Notation:*** 0 ≤ t ≤ 6, 1 ≤ h ≤ 25

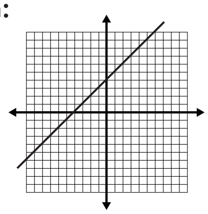
Number Lines: Domain:  Range:  ***Intervals:*** [0, 6], [1, 25]

Relations and Functions Lesson Three: Functions

Introduction:

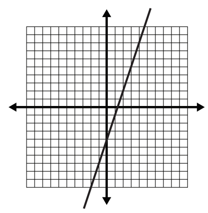
a)

x	f(x)
-2	2
-1	3
0	4
1	5
2	6



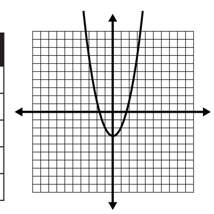
b)

x	f(x)
-2	-10
-1	-7
0	-4
1	-1
2	2



c)

x	f(x)
-2	1
-1	-2
0	-3
1	-2
2	1



Example 1: a) -16 b) 7 c) -4 d) 7 e) 4 f) 5

Example 2: a) -6 b) 2 c) 3 d) -2

Example 3: a) no b) yes c) no d) yes

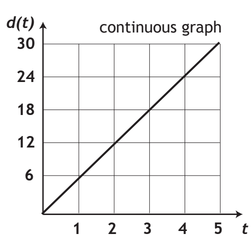
Example 4: a) 2 b) 24 c) no

Example 5:

a)

t	d
0	0
1	6
2	12
3	18
4	24
5	30

b) d(t) = 6t

c)


d) dependent: d
independent: t

e) t ≥ 0, d ≥ 0

f) 8.4 km

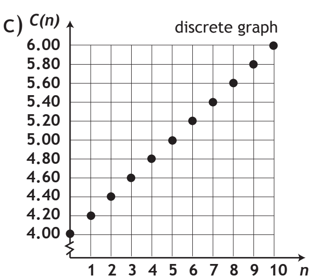
g) 15.6 km

Example 6:

a)

n	C
0	4.00
1	4.20
2	4.40
3	4.60
4	4.80
5	5.00

b) C(n) = 0.20n + 4.00

c)


d) dependent: C
independent: n

e) Domain: {0, 1, 2, 3, 4, 5 6, 7, 8, 9, 10}
Range: {4.00, 4.20, 4.40, 4.60,4.80, 5.00, 5.20, 5.40, 5.60, 5.80, 6.00}

f) $5.40

g) 9

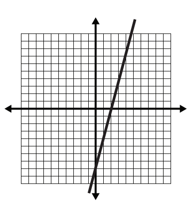
Relations and Functions Lesson Four: Intercepts

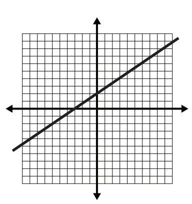
Introduction:

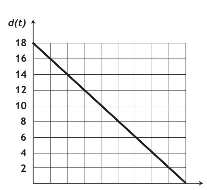
a) x-intercept: (2, 0)
y-intercept: (0, -8)

b) x-intercept: (-3, 0)
y-intercept: (0, 2)

c) t-intercept: (9, 0)
d-intercept: (0, 18)



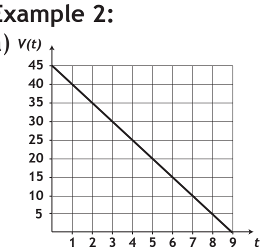




Example 1:

a) k = -5 b) k = 6

Example 2:

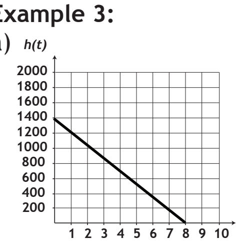
a)


b) V(t) = -5t + 45

c) The V-intercept is the initial volume of water. The t-intercept is the time when the tank is empty

d) 0 ≤ t ≤ 9, 0 ≤ V ≤ 45

Example 3:

a)


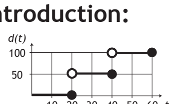
b) h(t) = -175t + 1400

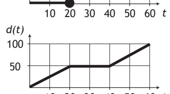
c) The h-intercept is the initial height of the climber (1400 m). The t-intercept is the time the climber reaches the ground (8 hours).

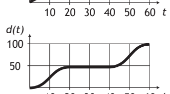
d) 0 ≤ t ≤ 8, 0 ≤ h ≤ 1400

Relations and Functions Lesson Five: Interpreting Graphs

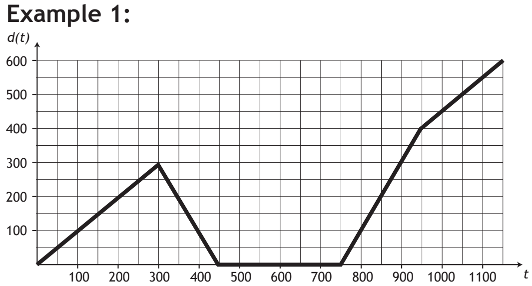
Introduction:

a)


b)


c)


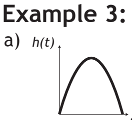
Example 1:

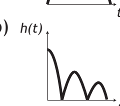


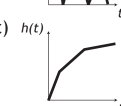
Example 2:

a) impossible
b) possible
c) impossible

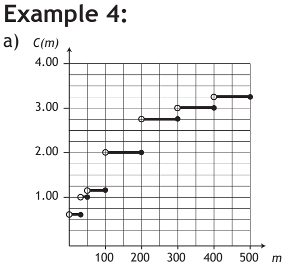
Example 3:

a)


b)


c)


Example 4:

a)


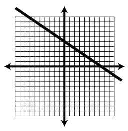
b) 0 < m ≤ 500,
{0.57, 1.00, 1.22, 2.00, 2.75, 3.00, 3.25}

Answer Key

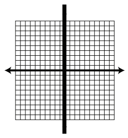
Linear Functions Lesson One: Slope of a Line

Introduction:
a) 2/3
b) -3
c) 0
d) undefined

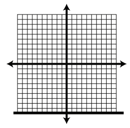
Example 1:
a) -2/3



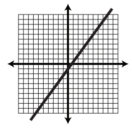
b) undefined



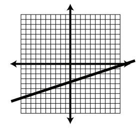
c) 0



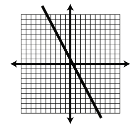
d) 4/3



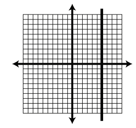
Example 2:
a) 1/3



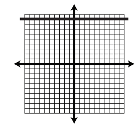
b) -2



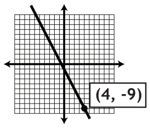
c) undefined



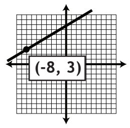
d) 0



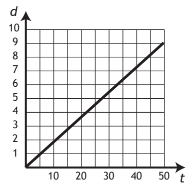
Example 3:
a) a = -9



b) a = -8



Example 4:
a)



b) speed = 0.18 m/s

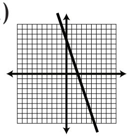
c) distance is the dependent variable, and time is the independent variable.
Equation: d = 0.18t

d) 86.4 m

e) 1.5 hours

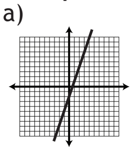
Linear Functions Lesson Two: Slope-Intercept Form

Introduction:
a)

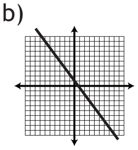


b) y = -3x + 7
c) y = 3
d) x = -6

Example 1:
a)

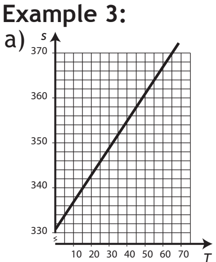


b)



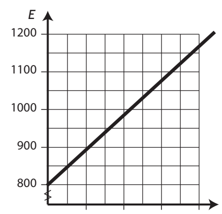
Example 2: a) y = -1/2x - 4 b) y = 8 c) x = -5

Example 3:
a)



b) s(T) = 0.6t + 331
c) 352 m/s
d) 55 °C

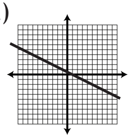
Example 4:
a) E(s) = 0.09s + 800



b) $1025
c) $2400

Linear Functions Lesson Three: Slope-Point Form

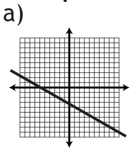
Introduction:
a)



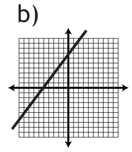
b) $y - 3 = -\frac{1}{2}(x + 5)$

c) Use slope-intercept when the y-intercept is easily read from a graph. Use slope-point otherwise.

Example 1:
a)

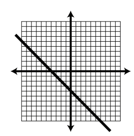


b)

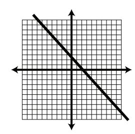


Example 2: a) $y - 4 = -\frac{1}{3}(x + 2)$ b) $y - 2 = \frac{3}{2}(x + 3)$

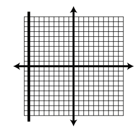
Example 3:
a) $y + 1 = -(x + 3)$



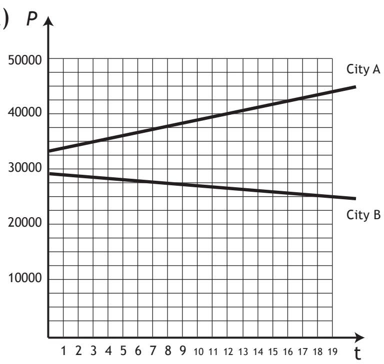
b) $y - 7 = -\frac{10}{9}(x + 4)$



c) $x = -9$



Example 4:
a)

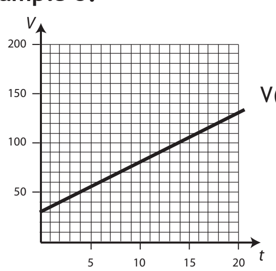


b) City A: 620 people/year
City B: -220 people/year

c) City A: $P_A(t)$ = 620t + 32760
City B: $P_B(t)$ = -220t + 29610

d) City A: 44540 people
City B: 25430 people

Example 5:
a)

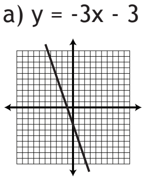


V(t) = 5t + 29

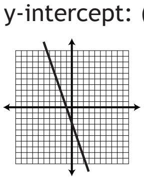
b) 114 L c) 21 minutes

Linear Functions Lesson Four: General Form

Introduction:
a) y = -3x - 3

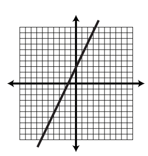


b) x-intercept: (-1, 0)
y-intercept: (0, -3)

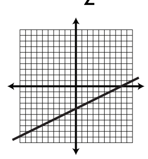


c) 3x + y + 3 = 0

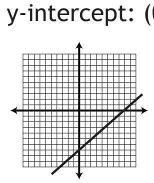
Example 1:
a) y = 2x + 3



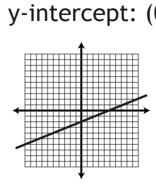
b) $y = \frac{1}{2}x - 4$



Example 2:
a) x-intercept: (8, 0)
y-intercept: (0, -7)



b) x-intercept: (5, 0)
y-intercept: (0, -2)



Example 3:
a) x - 2y - 11 = 0 b) 8x + 3y + 24 = 0

General Form Continues...

Answer Key

... Continuing General Form.

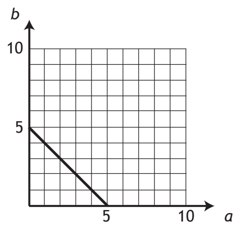
Example 4:

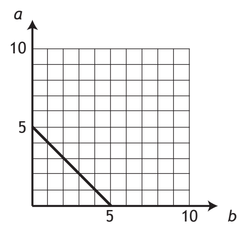
a)

a	b	sum
0	5	5
1	4	5
2	3	5
3	2	5
4	1	5
5	0	5

b) b = -a + 5 OR a = -b + 5
There is no independent or dependent variable.

c)





Example 5:

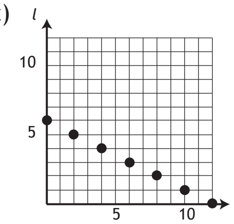
a)

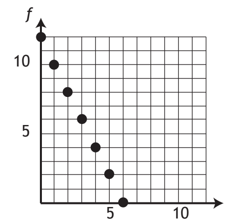
fans ($10)	lamps ($20)	revenue
0	6	120
12	0	120

b) $l = -\frac{1}{2}f + 6$ OR f = -2l + 12

There is no independent or dependent variable.

c)





Example 6:

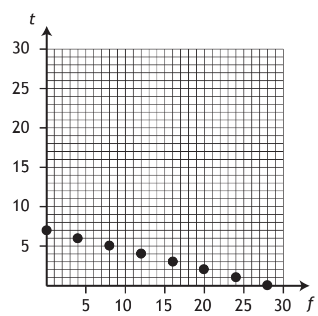
a)

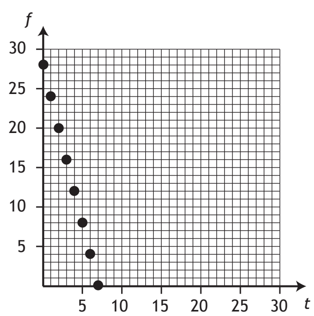
fives ($5)	twenties ($20)	total amount
0	7	$140
28	0	$140

b) $t = -\frac{1}{4}f + 7$ OR f = -4t + 28

There is no independent or dependent variable.

c)





d) yes e) no f) 8 fives

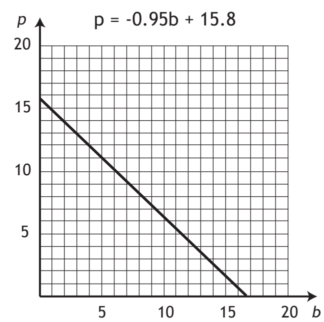
Example 7:

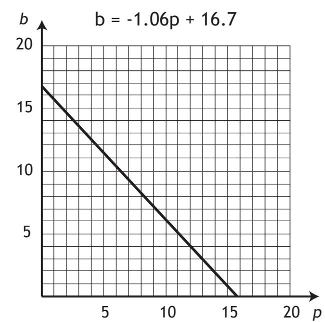
a) 720b + 760p = 12000

b)

volume of beets	volume of potatoes
0	15.8
16.7	0

c)





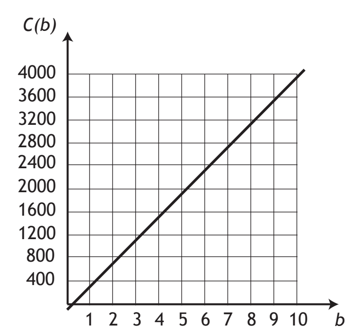
d) 8.96 m^3

Example 8:

a) C = 400b. The dependent variable is Calories, and the independent variable is the number of bowls.

b) C(b) = 400b. This relation is a function because we have a dependent and independent variable, and the graph passes the vertical line test.

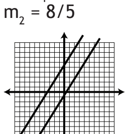
c) The relation must be graphed as C vs b since Calories is the dependent variable *(must go on y-axis)*, and the number of bowls is the independent variable *(must go on x-axis)*.



Linear Functions Lesson Five: Parallel and Perpendicular Lines

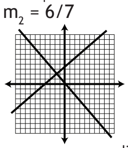
Introduction:

a) m_1 = 8/5
m_2 = 8/5



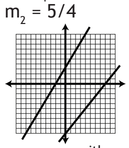
parallel

b) m_1 = -7/6
m_2 = 6/7



perpendicular

c) m_1 = 5/3
m_2 = 5/4



neither

Example 1:

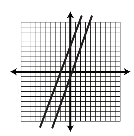
a) i) a = 10, ii) a = -32/5
b) i) a= -2/3 ii) a = 6
c) i) undefined, ii) 0

Example 2:

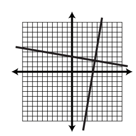
a) a = 6
b) a = 5

Example 3:

a) original line:
y = 3x + 5
parallel line:
y = 3x- 1

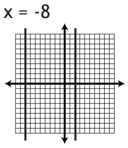


b) original line:
y = -1/6x + 3
parallel line:
y = 6x - 25

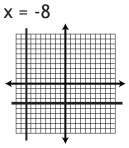


Example 4:

a) original line:
x = 2
parallel line:
x = -8

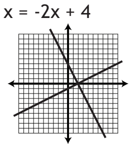


b) original line:
y = -4
perpendicular line:
x = -8



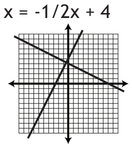
Example 5:

original line:
y = 1/2x - 1
perpendicular line:
x = -2x + 4



Example 6:

original line:
y = 2x + 5
perpendicular line:
x = -1/2x + 4



Example 7:

a = 1

Answer Key

Systems of Equations Lesson One: Solving Systems Graphically

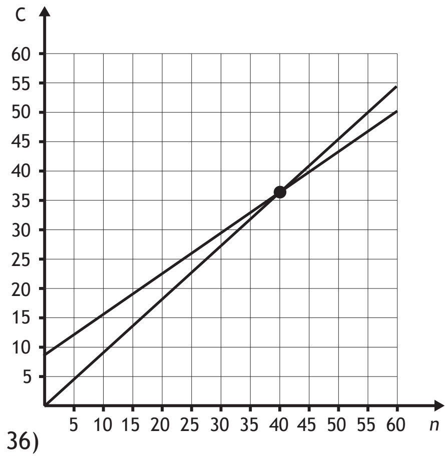
Introduction:

subscription

n	Cost
0	8.00
5	11.50
10	15.00
15	18.50
20	22.00
25	25.50
30	29.00
35	32.50
40	36.00
45	39.50
50	43.00
55	46.50
60	50.00

pay-as-you-go

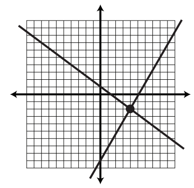
n	Cost
0	0
5	4.50
10	9.00
15	13.50
20	18.00
25	22.50
30	27.00
35	31.50
40	36.00
45	40.50
50	45.00
55	49.50
60	54.00



The solution to the system is (40, 36)
The pay-as-you-go option is a better deal for less than 40 downloads.
The subscription option is a better deal for more than 40 downloads.

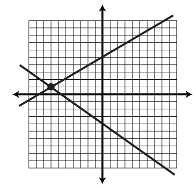
Example 1:

a) equation 1: y = -3/4x + 1
equation 2: y = 7/4x - 9



solution: (4, -2)

b) equation 1: y = 4/7x + 5
equation 2: y = -5/7x - 4

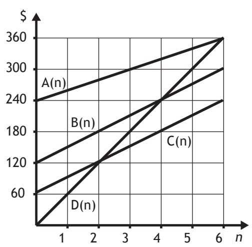


solution: (-7, 1)

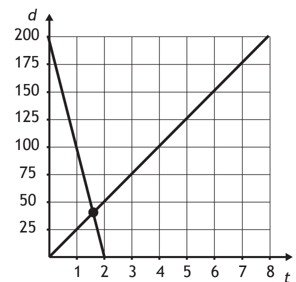
Example 2:
a) one solution b) infinite solutions c) no solution

Example 3:
a) infinite solutions b) infinite solutions
c) no solution d) no solution

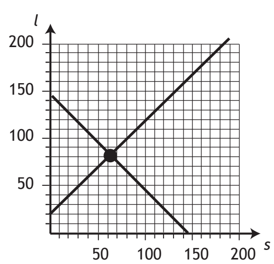
Example 4:
a) A(n) = 20n + 240, B(n) = 30n + 120,
C(n) = 30n + 60, D(n) = 60n
b) 4 weeks
c) yes, in 6 weeks



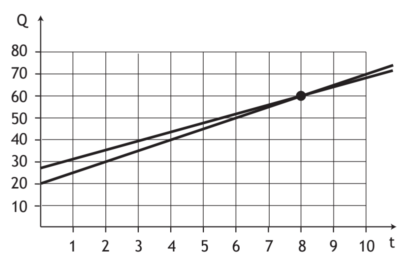
Example 5:
a) 1.6 hours
b) 40 km from Edmonton



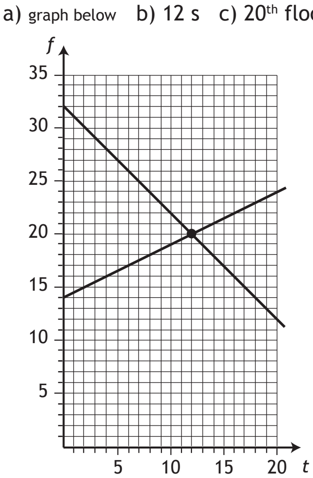
Example 6:
small area = 62.5 m^2
large area = 82.5 m^2



Example 7:
a) 8 hours
b) 120 questions in total from both teachers.



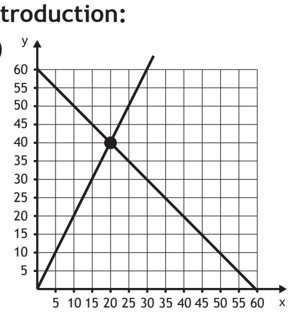
Example 8:
a) graph below b) 12 s c) 20th floor



Systems of Equations Lesson Two: Substitution

Introduction:

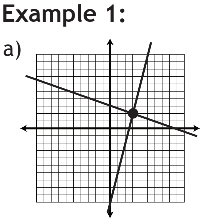
a)



b) the short part of the cable is 20 m, and the long part is 40 m.

Example 1:

a)



b) solution: (3, 2)

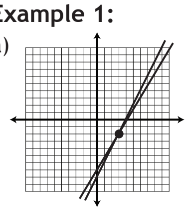
Example 2: a) (2, 2) b) (-5, -4) c) infinite d) no solution
Example 3: 14 dimes, 22 nickels
Example 4: 250 km
Example 5: Multiple Choice: 25 points, Written: 50 points
Example 6: \$1800 (lower yield), \$3200 (higher yield)
Example 7: scoop 1: 420 g, scoop 2: 180 g
Example 8: a = 1, b = 3

Systems of Equations Lesson Three: Elimination

Introduction: strawberries: \$4, raspberries: \$5

Example 1:

a)



b) solution: (3, -2)

Example 2: a) (-4, -2) b) infinite solutions c) no solution
Example 3: 26 nickels, 7 quarters
Example 4: 13 motorcycles, 22 cars
Example 5: canoe: 12 km/h, current: 3 km/h
Example 6: 117 adult tickets, 116 child tickets
Example 7: Corrine: 23, Corrine's mom: 48
Example 8: Calgary to Regina: 765 km, Regina to Winnipeg: 570 km