Answer Key

Algebra I

NEXT GENERATION

Regents Questions

through January, 2023

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Notation

A code next to each Regents Question number states from which Algebra I Common Core Regents exam the question came. For example, AUG '18 [25] means the question appeared on the August 2018 exam as question 25.

In future editions, after the first administration of the Next Generation Regents exams, these codes will be preceded by "CC" or "NG" to distinguish between Common Core and Next Generation.

Chapter 1. Equations and Inequalities

1.1 Properties of Real Numbers

1. JUN '14 [1] Ans: 1
2. AUG '17 [1] Ans: 4
3. JAN '18 [1] Ans: 4
4. JAN '19 [8] Ans: 4
5. JUN '19 [9] Ans: 4
6. AUG '22 [19] Ans: 4
7. AUG '19 [26]
   Commutative; the property is correct because $-5a + 7 = 7 - 5a$.
8. JAN '20 [29]
   Distributive Property; Addition Property

1.2 Solve Linear Equations in One Variable

1. JUN '17 [19] Ans: 1
2. AUG '18 [4] Ans: 2
3. JUN '21 [2] Ans: 1
4. JUN '21 [6] Ans: 4
5. JAN '23 [7] Ans: 2

1.3 Solve Equations with Fractions

1. JUN '14 [5] Ans: 1
2. AUG '14 [20] Ans: 1
3. AUG '17 [13] Ans: 2
4. JAN '18 [22] Ans: 4
5. JAN '19 [5] Ans: 2
6. AUG '19 [4] Ans: 3
7. JAN '20 [5] Ans: 2
8. AUG '22 [17] Ans: 3
9. JUN '18 [30]

   $6 - \frac{2}{3}(x + 5) = 4x$

   $3(6) - 3\left[\frac{2}{3}(x + 5)\right] = 3(4x)$

   $18 - 2(x + 5) = 12x$

   $18 - 2x - 10 = 12x$

   $8 - 2x = 12x$

   $8 = 14x$

   $x = \frac{8}{14} = \frac{4}{7}$

10. JUN '19 [25]

    $12\left[-\frac{2}{3}(x + 12)\right] + 12\left[\frac{2}{3}x\right] =$

    $12\left[-\frac{5}{4}x\right] + 12[2]$

    $-8(x + 12) + 8x = -15x + 24$

    $-8x - 96 + 8x = -15x + 24$

    $-96 = -15x + 24$

    $-120 = -15x$

    $x = 8$

1.4 Solve Linear Inequalities in One Variable

1. JAN '15 [7] Ans: 1
2. JUN '16 [9] Ans: 4
3. AUG '16 [7] Ans: 1
4. JUN '17 [13] Ans: 4
5. AUG '17 [11] Ans: 1
6. JAN '18 [17] Ans: 2
7. JUN '18 [1] Ans: 4
8. JAN '20 [3] Ans: 1
9. JUN '22 [7] Ans: 1
10. JUN '14 [27]
    $2(-1) + a(-1) - 7 > -12$
    $-9 - a > -12$
    $-a > -3$
    $a < 3$
    Ans: 2
11. AUG '14 [30]
    $3x + 9 \leq 5x - 3$
    $12 \leq 2x$
    $6 \leq x$
    Ans: 6
12. JUN '15 [30]
    $-8x + 7 < 15$
    $-8x < 8$
    $x > -1$
    Ans: 0
13. AUG '15 [34]
    $7x - 12x + 24 \leq 6x + 12 - 9x$
    $-5x + 24 \leq -3x + 12$
    $12 \leq 2x$
    $6 \leq x$ or $x \geq 6$
    {6,7,8} is the set of integers that are greater than or equal to 6 in the interval
14. JAN '17 [27]
    $1.8 - 0.4y \geq 2.2 - 2y$
    $1.6y \geq 0.4$
    $y \geq 0.25$
15. JAN '19 [25]
    $3600 + 1.02x < 2000 + 1.04x$
    $1600 < 0.02x$
    $80{,}000 < x$ or $x > 80{,}000$
16. AUG '19 [29]
    $15\left[\frac{3}{5}x\right] + 15\left[\frac{1}{3}\right] < 15\left[\frac{4}{5}x\right] - 15\left[\frac{1}{3}\right]$
    $9x + 5 < 12 - 5$
    $10 < 3x$
    $\frac{10}{3} < x$
17. JUN '21 [25]
    $4y - 12 \leq 8y + 4$
    $-12 \leq 4y + 4$
    $-16 \leq 4y$
    $-4 \leq y$
18. JAN '23 [27]
    $3\left[-\frac{2}{3}x + 6 > -12\right]$
    $-2x + 18 > -36$
    $-2x > -54$
    $x < 27$

1.5 Solve Literal Equations and Inequalities

1. JAN '16 [6] Ans: 3
2. JAN '17 [4] Ans: 3
3. JUN '17 [2] Ans: 2
4. JUN '17 [23] Ans: 3
5. JUN '18 [23] Ans: 4
6. JAN '19 [20] Ans: 2
7. JUN '19 [13] Ans: 4
8. JUN '22 [11] Ans: 1
9. JUN '22 [23] Ans: 4
10. AUG '22 [24] Ans: 4
11. JAN '23 [18] Ans: 2
12. AUG '14 [34]

    $2A = h(b_1 + b_2)$

    $\frac{2A}{h} = b_1 + b_2$

    $\frac{2A}{h} - b_2 = b_1$

    $b_1 = \frac{2 \cdot 60}{6} - 12 = 8$ ft.
13. JAN '16 [31]

    $bx - 3b \geq ax + 7b$

    $-10b \geq (a - b)x$

    $-\frac{10b}{a-b} \geq x$
14. JUN '16 [31]

    $\frac{S}{180} = n - 2$

    $\frac{S}{180} + 2 = n$
15. AUG '16 [32]

    $4ax + 12 - 3ax = 25 + 3a$

    $ax + 12 = 25 + 3a$

    $ax = 13 + 3a$

    $x = \frac{13+3a}{a}$
16. AUG '18 [29]

    $\frac{9}{5}K = F + 459.67$

    $F = \frac{9}{5}K - 459.67$
17. JUN '19 [30]

    $V = \frac{1}{3}\pi r^2 h$

    $3V = \pi r^2 h$

    $h = \frac{3V}{\pi r^2}$
18. AUG '19 [28]

    $at = v_f - v_i$

    $at + v_i = v_f$
19. JAN '20 [32]

    $2S = n(a + b)$

    $\frac{2S}{n} = a + b$

    $\frac{2S}{n} - a = b$
20. JUN '21 [31]

    $C = \frac{5}{9}(F - 32)$

    $\frac{9}{5}C = F - 32$

    $\frac{9}{5}C + 32 = F$

Chapter 2. Verbal Problems

2.1 Translate Expressions

1. AUG '15 [3] Ans: 4
2. JAN '17 [18] Ans: 4
3. AUG '17 [12] Ans: 2
4. AUG '19 [1] Ans: 3

2.2 Translate Equations

1. MAY '13 [4] Ans: 4
2. JUN '14 [16] Ans: 2
3. JAN '16 [11] Ans: 2
4. AUG '16 [16] Ans: 3
5. JUN '19 [15] Ans: 2
6. AUG '19 [20] Ans: 2
7. JUN '22 [13] Ans: 1
8. AUG '22 [29]
   $b = 2(a + 15)$

2.3 Linear Model in Two Variables

1. JUN '14 [7] Ans: 3
2. JUN '14 [22] Ans: 4
3. AUG '14 [2] Ans: 2
4. JAN '15 [1] Ans: 2
5. JAN '15 [23] Ans: 4
6. JUN '15 [1] Ans: 3
7. AUG '15 [8] Ans: 4
8. AUG '16 [14] Ans: 3
9. JAN '17 [9] Ans: 2
10. AUG '17 [9] Ans: 4
11. JAN '18 [7] Ans: 4
12. JUN '18 [17] Ans: 3
13. AUG '18 [17] Ans: 2
14. JUN '21 [1] Ans: 2
15. JUN '22 [3] Ans: 2
16. JUN '15 [26]
    $f(x) = 6.5x + 4(12)$
    $f(x) = 6.5x + 48$
17. JAN '17 [30]
    $C = 0.99(s - 1) + 1.29$
    No. $C = 0.99(52 - 1) + 1.29 = 51.78$
18. JAN '18 [33]
    $P(x) = 0.035x + 300$;
    $0.035(8250) + 300 = 588.75$

2.4 Word Problems – Linear Equations

1. AUG '15 [10] Ans: 2
2. MAY '13 [5]
   $12x + 9(2x) + 5(3x) = 15$
   $45x = 15$
   $x = \frac{1}{3}$
   $x + 2x + 3x = 6x = 6\left(\frac{1}{3}\right) = 2$ lbs.
3. JUN '21 [34]
   $1.25x + 0.55(x + 4) + 0.75(x - 2) = 16$
   $1.25x + 0.55x + 2.2 + 0.75x - 1.5 = 16$
   $2.55x + 0.7 = 16$
   $2.55x = 15.3$
   $x = 6$

2.5 Translate Inequalities

1. AUG '15 [5] Ans: 4
2. JUN '16 [7] Ans: 2
3. JUN '18 [6] Ans: 1
4. JUN '19 [10] Ans: 1
5. JUN '21 [7] Ans: 2
6. JUN '22 [5] Ans: 3

2.6 Word Problems – Inequalities

1. JAN '15 [13] Ans: 3
2. JUN '15 [24] Ans: 4
3. JAN '19 [4] Ans: 1
4. SEP '13 [9]
   $8x + 11y \geq 200$;
   $8x + 11(15) \geq 200$
   $8x + 165 \geq 200$
   $8x \geq 35$
   $x \geq 4.375$
   5 hours
5. AUG '18 [33]
   $135 + 72x \geq 580$
   $72x \geq 445$
   $x \geq 6.2$
   Minimum of 7 weeks
6. JUN '19 [33]
   $A = 5x + 50$
   $B = 6x + 25$
   $5x + 50 < 6x + 25$
   $25 < x$
   Minimum of 26 shirts
7. JAN '20 [26]
   $6.25a + 4.50y \leq 550$
   $6.25a + 4.50(45) \leq 550$
   $6.25a + 202.50 \leq 550$
   $6.25a \leq 377.50$
   $a \leq 55.6$
   Maximum of 55 adult-sized T-shirts
8. AUG '22 [35]
   $1.99x + 2.50(x + 2) + 2.99(2) \leq 25$
   $1.99x + 2.50x + 5 + 5.98 \leq 25$
   $4.49x + 10.98 \leq 25$
   $4.49x \leq 14.02$
   $x \leq 3.1225$
   Maximum of 3 pounds of grapes

2.7 Conversions

1. JAN '15 [2] Ans: 2
2. JUN '16 [8] Ans: 1
3. AUG '16 [9] Ans: 3
4. JUN '17 [20] Ans: 4
5. JUN '18 [15] Ans: 1
6. AUG '18 [12] Ans: 3
7. JAN '19 [24] Ans: 4
8. JUN '19 [24] Ans: 1
9. AUG '19 [9] Ans: 4
10. JUN '21 [23] Ans: 2
11. JUN '22 [22] Ans: 1
12. AUG '22 [21] Ans: 2
13. JAN '23 [23] Ans: 4
14. JAN '17 [26]
    $\frac{12\ \cancel{km}}{1\ hr} \times \frac{0.62\ mi}{1\ \cancel{km}} = 7.44\ mph$
    $\frac{7.44\ mi}{1\ hr} = \frac{26.2\ mi}{x\ hrs}$
    $x \approx 3.5\ hrs$

15. AUG ’17 [30]

The grasshopper jumps 20 times its height. $5'9" = 69$ inches. Therefore, the athlete jumps $69 \times 20 = 1380$ in per jump.

$1380\ in \cdot \frac{1\ ft}{12\ in} = 115$ ft per jump.

1 mile = 5280 ft would take $\frac{5280}{115} \approx 46$ jumps.

16. JAN ’18 [27]

The rate of speed is measuring distance over time, so it would be expressed in feet per minute.

17. JAN ’20 [27]

$\frac{4\ \cancel{pints}}{1\ \cancel{day}} \times \frac{2\ \cancel{cups}}{1\ \cancel{pint}} \times \frac{8\ ounces}{1\ \cancel{cup}} \times \frac{7\ \cancel{days}}{1\ week} = \frac{448\ ounces}{1\ week}$

Chapter 3. Linear Graphs

3.1 Determine Whether a Point is on a Line

1. AUG '16 [2] Ans: 3
2. AUG '17 [20] Ans: 3
3. JAN '20 [11] Ans: 1
4. JUN '22 [18] Ans: 4
5. AUG '22 [5] Ans: 4
6. JAN '23 [2] Ans: 4

3.2 Lines Parallel to Axes

There are no Regents exam questions on this topic.

3.3 Find Intercepts

1. AUG '14 [8] Ans: 1
2. JAN '15 [9] Ans: 4

3.4 Find Slope Given Two Points

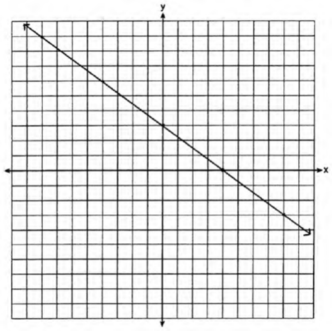
There are no Regents exam questions on this topic.

3.5 Find Slope Given an Equation

There are no Regents exam questions on this topic.

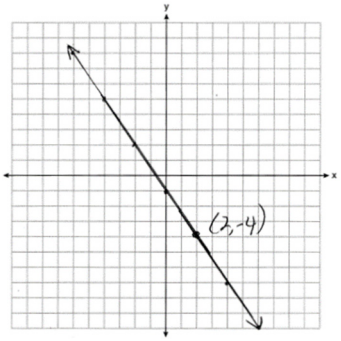
3.6 Graph Linear Equations

1. AUG '14 [13] Ans: 2
2. JUN '14 [29]



No, the point is not on the line.

3. AUG '19 [27]



$k = -4$

4. JUN '21 [27]

The height of the balloon increases 30.5 ft. per min. The balloon starts at a height of 8.7 ft.

3.7 Write an Equation Given a Point and Slope

There are no Regents exam questions on this topic.

3.8 Write an Equation Given Two Points

1. JAN '15 [11] Ans: 4
2. JUN '21 [24] Ans: 1
3. JUN '16 [29]

   Sue used point-slope form and Kathy used slope-intercept form. Both are correct as shown:

   $m = \frac{4-1}{-3-6} = -\frac{1}{3}$

   $y - y_1 = m(x - x_1)$

   $y - 4 = -\frac{1}{3}(x + 3)$

   $y = mx + b$

   $4 = -\frac{1}{3}(-3) + b$

   $4 = 1 + b$

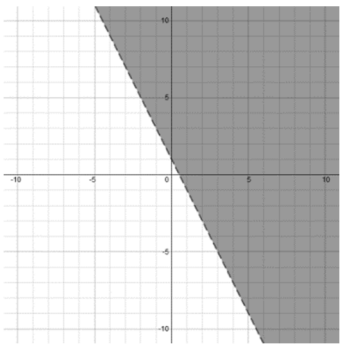
   $3 = b$

   $y = -\frac{1}{3}x + 3$

3.9 Graph Inequalities

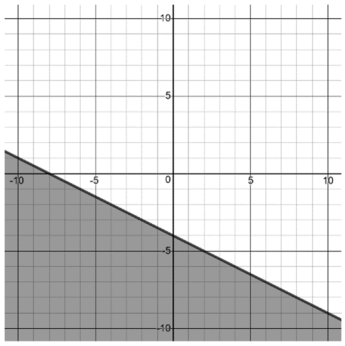
1. JUN '15 [5] Ans: 1
2. JAN '16 [5] Ans: 2
3. AUG '15 [26]

   $y > -2x + 1$

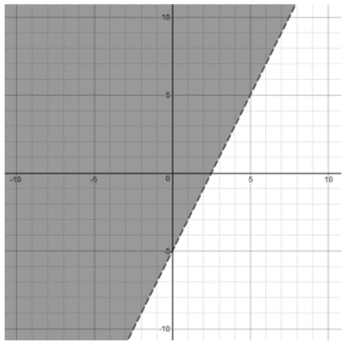


4. AUG '16 [34]

   The graph should be shaded below the line. Shawn may have forgotten to flip the sign when dividing by a negative while solving for *y*.

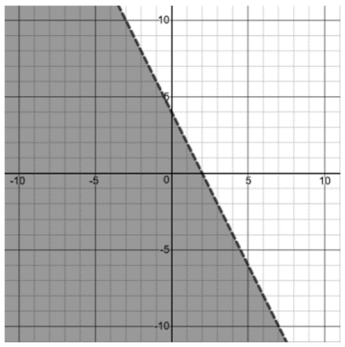


5. JAN '17 [29]



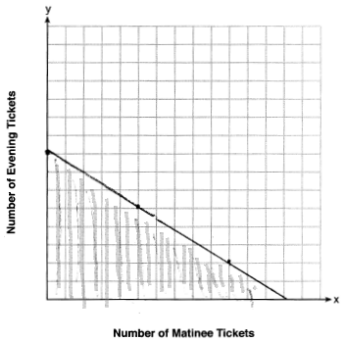
Any point in the shaded area but not on the dashed line, such as (0,0).

6. JUN '17 [30]



7. JAN '19 [35]

$7.5x + 12.5y \leq 100$



$7.5x \leq 100$

$x \leq 13.\overline{3}$, so the maximum is 13

Chapter 4. Linear Systems

4.1 Solve Linear Systems Algebraically

1. JUN '14 [14] Ans: 2
2. JAN '16 [21] Ans: 4
3. AUG '16 [22] Ans: 4
4. AUG '17 [24] Ans: 4
5. JAN '18 [15] Ans: 2
6. AUG '18 [22] Ans: 3
7. JAN '19 [22] Ans: 3
8. AUG '19 [22] Ans: 1
9. JAN '20 [20] Ans: 2
10. JUN '21 [20] Ans: 2

11. JUN '15 [33]

$$\begin{array}{rl} 3(8x+9y=48) \rightarrow & 24x+27y=144 \\ -2(12x+5y=21) \rightarrow & \underline{-24x-10y=-42} \\ & 17y=102 \end{array}$$

$y = 6$

$y = \frac{-51}{-8.5} = 6,$

$8x + 9(6) = 48$

$8x = -6$

$x = -\frac{3}{4},$

Yes, $x = -\frac{3}{4}$ and $y = 6$ for both

4.2 Solve Linear Systems Graphically

1. JAN '15 [18] Ans: 3
2. JUN '16 [18] Ans: 4
3. JUN '17 [8] Ans: 1

4. JAN '17 [25]

No. The two lines coincide, so there are infinitely many solutions.

4.3 Solutions to Systems of Inequalities

1. SEP '13 [1] Ans: 2

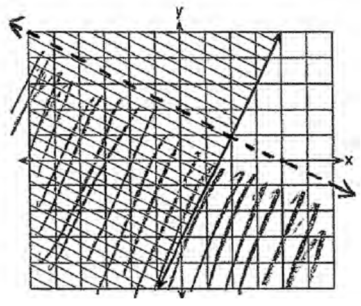
2. JAN '17 [16] Ans: 4

4.4 Solve Systems of Inequalities Graphically

1. JUN '14 [4] Ans: 2
2. AUG '14 [7] Ans: 1
3. AUG '15 [6] Ans: 3
4. JAN '18 [20] Ans: 3

5. JAN '15 [34]

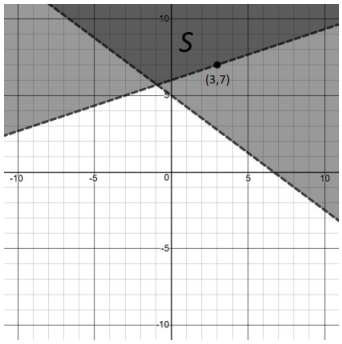
$y \geq 2x - 3,$



,

Disagree since (2,1) is not a solution of $x + 2y < 4$

6. AUG '17 [35]

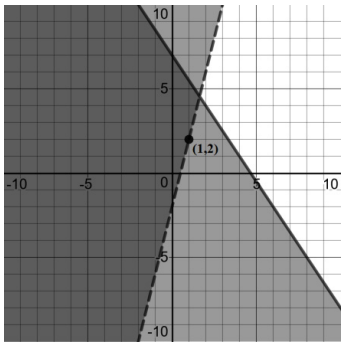


(3,7) is not in the solution set because it is on a dashed boundary.

7. JAN '18 [28]

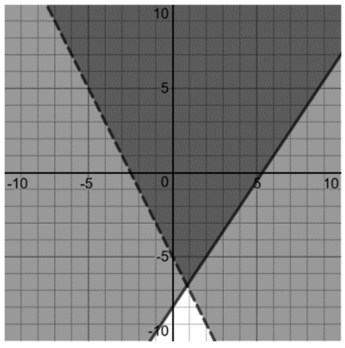
(0,4) is located at the intersection of the two lines. However, since the line for the inequality $y < \frac{1}{2}x + 4$ is dashed, this point is not a solution to the system.

8. JUN '18 [35]



(1,2) is not in the solution set because it lies on the dashed line.

9. AUG '18 [35]



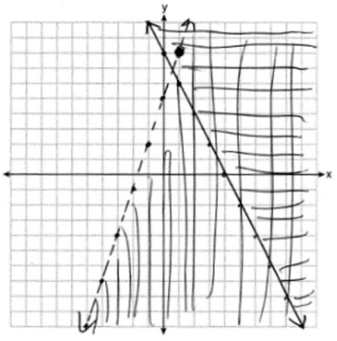
(6,1) is on a solid line; (–6,7) is on a dashed line.

10. JUN '19 [36]

$y < -3x + 3$ and $y \leq 2x - 2$

Region A represents the solution set of the system. The gray region represents the solution set of $y \leq 2x - 2$.

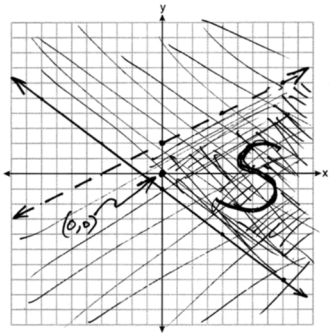
11. AUG '19 [33]



No, (1,8) falls on the boundary line of $y - 5 < 3x$, which is a dashed line. The points on a dashed line are not included in the solution.

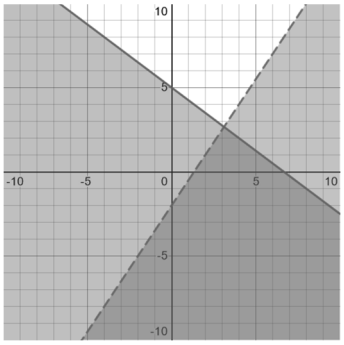
12. JAN '20 [34]

$y < \frac{1}{2}x + 2$ and $y \geq -\frac{3}{4}x - 1$



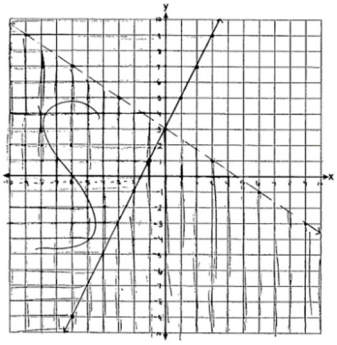
Stephen is correct because (0,0) lies in the double-shaded region S, so it is in the solution set.

13. JUN ’21 [35]



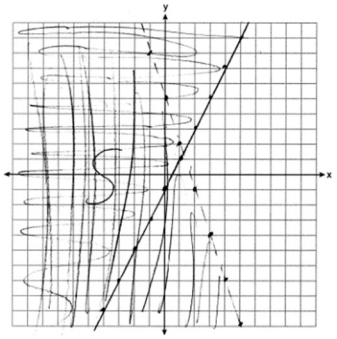
No, (6,3) does not lie in the solution set represented by the double-shaded region.

14. JUN ’22 [36]



No, as $2(0) + 3(3) = 9$.

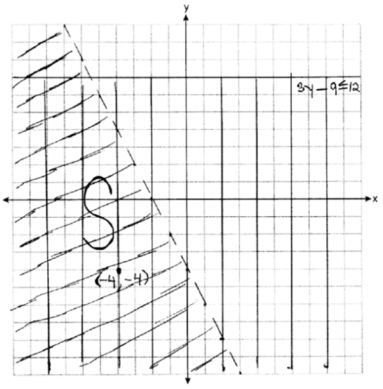
15. AUG ’22 [36]



Yes, $(-5,0)$ is in the double-shaded region S.

16. JAN ’23 [36]

Eq. 1 → $y \leq 7$



various answers such as $(-4, -4)$; the point lies in the double-shaded area

4.5 Word Problems – Linear Systems

1. AUG '14 [19] Ans: 4
2. JUN '15 [6] Ans: 3
3. JUN ’16 [5] Ans: 1
4. JAN ’18 [3] Ans: 1
5. AUG ’18 [9] Ans: 2

6. JUN '14 [36]

$2.35c + 5.50d = 89.50$,

No because

$2.35(8) + 5.50(14) = 95.80$,

$c + d = 22$

$d = 22 - c$

$2.35c + 5.50(22 - c) = 89.50$

$121 - 3.15c = 89.50$

$-3.15c = -31.50$

$c = 10$

10 cats

7. JAN '15 [33]

$2p + 3d = 18.25$ and $4p + 2d = 27.50$,

Eq. 1 × –2 → $-4p - 6d = -36.50$

Eq. 2 → $4p + 2d = 27.50$

$-4d = -9$

$d = 2.25$

$2p + 3(2.25) = 18.25$

$2p + 6.75 = 18.25$

$2p = 11.50$

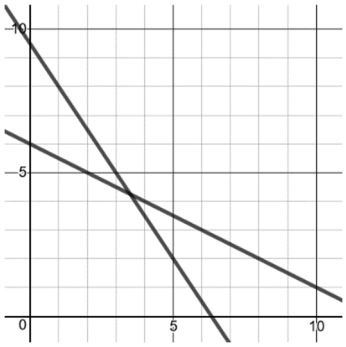
$p = 5.75$

popcorn \$5.75, drink \$2.25

8. JUN '16 [37]

$3x + 2y = 19$

$2x + 4y = 24$



Eq. 1 × 2 → $6x + 4y = 38$

Eq. 2 × –1 → $-2x - 4y = -24$

$4x = 14$

$x = 3.5$

$2(3.5) + 4y = 24$

$7 + 4y = 24$

$4y = 17$

$y = 4.25$

Cupcakes cost \$3.50 and brownies cost \$4.25 per package.

9. AUG '16 [37]

$18j + 32w = 19.92$

$14j + 26w = 15.76$

$14(0.52) + 26(0.33) = 15.86$

Eq. 1 × –7 → $-126j - 224w = -139.44$

Eq. 2 × 9 → $126j + 234w = 141.84$

$10w = 2.4$

$w = 0.24$

$18j + 32(0.24) = 19.92$

$18j + 7.68 = 19.92$

$18j = 12.24$

$j = 0.68$

A juice box is 68 cents and a water bottle is 24 cents.

10. JAN '17 [34]

Eq. 1 × –5 → $-5p - 10s = -79.75$

Eq. 2 × 2 → $6p + 10s = 91.80$

$p = 12.05$

11. JAN '17 [37]

$1000 - 60x = 600 - 20x$

$400 = 40x$

$10 = x$

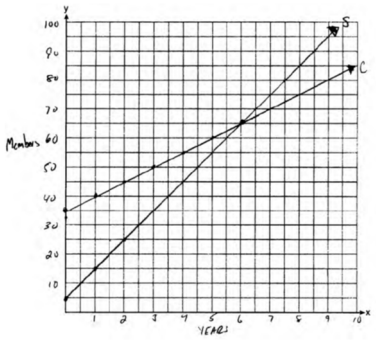
10 months

$1000 - 60(10) = \$400$

Ian is incorrect because $1000 - 60(16) = 40$, so he would still owe \$40.

12. JUN '17 [37]

$y = 10x + 5$ and $y = 5x + 35$.



(6,65) It took 6 years for the two clubs to have the same number of members, at which point they had 65 members each.

13. AUG '17 [28]

For \$50, Dylan can buy 14 games in Plan *B* but only 12 games in Plan *A*. Bobby can buy 20 games for \$65 under both plans, so he can choose either plan.

14. JAN '18 [37]

$d = 2c - 5$

$\frac{c+3}{d+3} = \frac{3}{4}$

No, because it doesn't make each equation true:

eg, $20 \neq 2(15) - 5$;

$\frac{c+3}{(2c-5)+3} = \frac{3}{4}$

$4(c + 3) = 3(2c - 2)$

$4c + 12 = 6c - 6$

$18 = 2c$

$c = 9$

$d = 2(9) - 5 = 13$

She had 9 cats and 13 dogs

15. JUN '18 [34]

$A(x) = 7 + 3(x - 2)$

$B(x) = 3.25x$

$7 + 3(x - 2) = 3.25x$

$7 + 3x - 6 = 3.25x$

$1 + 3x = 3.25x$

$1 = 0.25x$

$x = 4$ hours

16. JUN '18 [37]

$10d + 25q = 1755$

$d + q = 90$ or $d = 90 - q$

$10(90 - q) + 25q = 1755$

$900 - 10q + 25q = 1755$

$15q = 855$

$q = 57$

No, because $\$20.98 \times 1.08 > 90 \times 0.25$.

17. AUG '18 [37]

$b = 4s + 6$

$b - 3 = 7(s - 3)$

$4s + 6 - 3 = 7s - 21$

$3s = 24$

$s = 8$

$b = 4(8) + 6 = 38$

$38 + x = 3(8 + x)$

$38 + x = 24 + 3x$

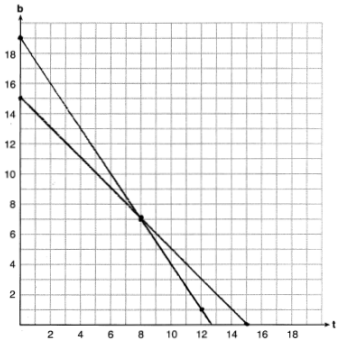
$2x = 14$

$x = 7$

18. JAN '19 [37]

$t + b = 15$

$3t + 2b = 38$



No, the point of intersection on the graph shows that 8 tricycles were ordered.

19. JUN '19 [37]

$4c + 3f = 16.53$

$5c + 4f = 21.11$

No, because $5(2.49) + 4(2.87) \neq 21.11$

Eq. $1 \times 4 \quad \rightarrow \quad 16c + 12f = 66.12$

Eq. $2 \times -3 \quad \rightarrow \underline{-15c - 12f = -63.33}$

$c = 2.79$

$4(2.79) + 3f = 16.53$

$3f = 5.37$

$f = 1.79$

20. AUG '19 [37]

$3.75A + 2.5D = 35$

$A + D = 12$

$3.75(12 - D) + 2.5D = 35$

$45 - 3.75D + 2.5D = 35$

$45 - 1.25D = 35$

$-1.25D = -10$

$D = 8$

$A + 8 = 12$, so $A = 4$

$7(2A + D) = 7(16) = 112$ eggs

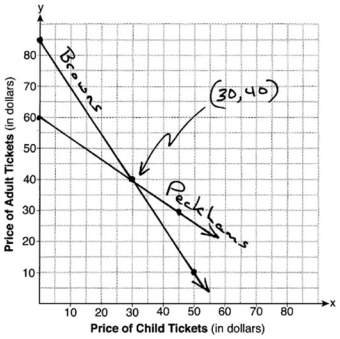
$112 \div 12 = 9\frac{1}{3}$ dozen

$\$2.50 \times 9 = \$22.50$

21. JAN '20 [37]

$3x + 2y = 170$

$4x + 6y = 360$



(30,40); child tickets cost \$30 and adult tickets cost \$40.

22. JUN '21 [37]

$4l + 8m = 40$

$5l + 2m = 28$

No, because $5(5.5) + 2(2.25) \neq 28$.

$-4l - 8m = -40$

$\underline{20l + 8m = 112}$

$16l = 72$

$l = 4.5$

$4(4.5) + 8m = 40$

$18 + 8m = 40$

$8m = 22$

$m = 2.75$

23. JUN '22 [37]

$4a + 2c = 325.94$

$2a + 3c = 256.95$

Eq. $1 \times -1 \rightarrow -4a - 2c = -325.94$

Eq. $2 \times 2 \rightarrow \quad \underline{4a + 6c = \quad 513.90}$

$4c = 187.96$

$c = 46.99$

$4a + 2(46.99) = 325.94$

$4a + 93.98 = 325.94$

$4a = 231.96$

$a = 57.99$

$57.99 + 3(46.99) = 198.96$

24. AUG '22 [37]

$30x + 50y = 420$

$15x + 35y = 270$

Peyton is wrong because

$15(2.75) + 35(6.75) = 277.50 \neq 270.$

Eq. $1 \times -1 \rightarrow \ -30x - 50y = -420$

Eq. $2 \times 2 \ \rightarrow \ \underline{30x + 70y = 540}$

$20y = 120$

$y = 6$

$30x + 50(6) = 420$

$30x = 120$

$x = 4$

Small sundaes are \$4 each and large sundaes are \$6 each

25. JAN '23 [35]

$l = 3w - 5$

$2l + 2w = 90;$

$2(3w - 5) + 2w = 90$

$6w - 10 + 2w = 90$

$8w = 100$

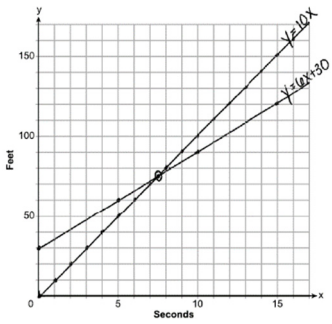
$w = 12.5$

$l = 3(12.5) - 5 = 32.5$

26. JAN '23 [37]

$y = 10x$

$y = 6x + 30$



$10 = 6x + 30$

$4x = 30$

$x = 7.5$ secs

4.6 Word Problems – Systems of Inequalities

1. JUN '17 [11] Ans: 1
2. AUG '18 [10] Ans: 2
3. JAN '23 [24] Ans: 2
4. MAY '13 [6]

$x + y \leq 800$ and $6x + 9y \geq 5000;$

yes, $6(440) + 9y \geq 5000$

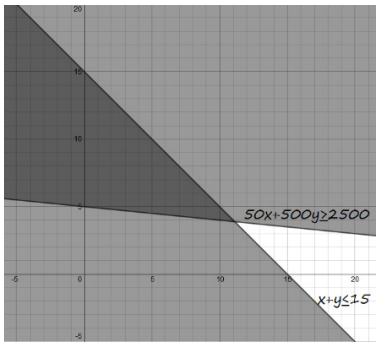
$2640 + 9y \geq 5000$

$9y \geq 2360$

$y \geq 262\frac{2}{9}$

$440 + 263 \leq 800$ ✓

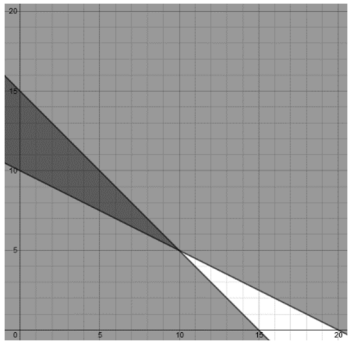
5. JUN '15 [35]



$50x + 500y \geq 2500$ and $x + y \leq 15;$ any point in the solution set, such as (4,7) for 4 printers, 7 computers

6. AUG '14 [37]

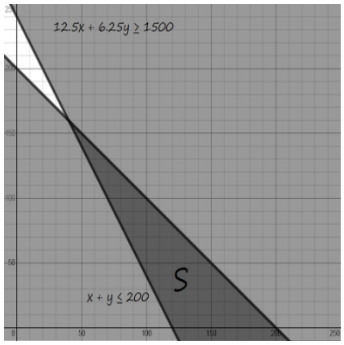
$x + y \leq 15$ and $4x + 8y \geq 80$



Solution stated such as (3,10) = 3 hrs. of babysitting and 10 hrs. at the library

7. JAN '16 [37]

$x + y \leq 200$ and $12.5x + 6.25y \geq 1500$

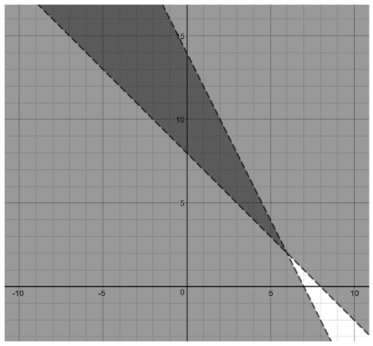


No, because the point (30,80) is not in the shaded area labelled S

8. JUN '16 [34]

$x + y > 8 \quad \rightarrow \quad y > -x + 8$

$2x + y < 14 \quad \rightarrow \quad y < -2x + 14$



(6,2) is not a solution as its falls on the edge of each inequality.

9. AUG '16 [35]

$x + y \leq 200$

$12x + 8.50y \geq 1000$

$12x + 8.50(50) \geq 1000$

$12x + 425 \geq 1000$

$12x \geq 575$

$x \geq \frac{575}{12} \approx 47.9$

Minimum of 48 tickets at the door

10. JAN '18 [35]

$2c + 1.5b \geq 500$

$c + b \leq 360$

$2(144) + 1.5b \geq 500$

$288 + 1.5b \geq 500$

$1.5b \geq 212$

$b \geq 141\frac{1}{3}$

At least 142 bottles must be sold

Chapter 5. Polynomials

5.1 Polynomial Expressions

1. JUN ’16 [2] Ans: 4
2. JUN ’18 [19] Ans: 3
3. JUN ’19 [5] Ans: 1
4. JAN ’20 [24] Ans: 4
5. JUN ’21 [22] Ans: 4
6. JUN ’22 [20] Ans: 2
7. AUG ’22 [8] Ans: 1
8. AUG ’22 [16] Ans: 2
9. JAN ’23 [3] Ans: 3
10. AUG ’16 [28]
    No, the leading coefficient is the coefficient of the term with the highest power, –2.

5.2 Add and Subtract Polynomials

1. JUN '14 [3] Ans: 2
2. JAN '15 [28]
   $-2x^2 + 6x + 4$
3. JUN ’17 [25]
   $5x^2 - 10$

5.3 Multiply Polynomials

1. JAN '15 [10] Ans: 2
2. AUG '15 [9] Ans: 3
3. AUG '15 [24] Ans: 4
4. JAN '16 [10] Ans: 3
5. JUN ’16 [10] Ans: 2
6. AUG ’16 [12] Ans: 3
7. JAN ’17 [7] Ans: 4
8. JAN ’18 [13] Ans: 3
9. JUN ’18 [3] Ans: 2
10. AUG ’18 [13] Ans: 1
11. AUG ’18 [24] Ans: 3
12. JAN ’19 [11] Ans: 3
13. AUG ’19 [3] Ans: 4
14. AUG ’19 [12] Ans: 2
15. JUN ’21 [8] Ans: 2
16. JUN ’22 [17] Ans: 3
17. AUG ’22 [6] Ans: 3
18. JAN ’23 [1] Ans: 1
19. AUG '14 [28]

	x	5
$2x^2$	$2x^3$	$10x^2$
$7x$	$7x^2$	$35x$
–10	$-10x$	–50

    $2x^3 + 17x^2 + 25x - 50$
20. JUN '15 [28]
    $(2x^2 - 5x + 7)\left(\frac{1}{2}x^2\right) = x^4 - \frac{5}{2}x^3 + \frac{7}{2}x^2$
21. AUG ’17 [31]
    $5x + 4x^2(2x + 7) - 6x^2 - 9x$
    $= 5x + 8x^3 + 28x^2 - 6x^2 - 9x$
    $= 8x^3 + 22x^2 - 4x$
22. JUN ’19 [26]
    $C = 3x^2 + 4 - 3(2x^2 + 6x - 5) =$
    $3x^2 + 4 - 6x^2 - 18x + 15 = -3x^2 - 18x + 19$

23. JAN '20 [28]

$3x^2 + 21x - 4x - 28 - \frac{1}{4}x^2$

$2.75x^2 + 17x - 28$

24. JUN '22 [28]

$6(x^2 - xy) = 6x^2 - 6xy$ and

$3x(x - 2y) = 3x^2 - 6xy$.

$(6x^2 - 6xy) - (3x^2 - 6xy) = 3x^2$

5.4 Divide a Polynomial by a Monomial

There are no Regents exam questions on this topic.

Chapter 6. Introduction to Functions

6.1 Recognize Functions

1. JUN '15 [4] Ans: 3
2. AUG '15 [11] Ans: 2
3. JUN '17 [9] Ans: 3
4. JAN '18 [4] Ans: 2
5. JUN '18 [11] Ans: 4
6. JAN '19 [7] Ans: 4
7. JUN '19 [3] Ans: 4
8. AUG '19 [2] Ans: 4
9. JAN '20 [4] Ans: 2
10. JUN '21 [4] Ans: 4
11. AUG '22 [4] Ans: 4
12. JAN '23 [5] Ans: 1
13. JAN '15 [27]
    (–4,1) because the input –4 would lead to two different outputs, which a function cannot have
14. JAN '16 [26]
    no, it is not a function because for $x = 2$, there are two different values of y.
15. JAN '17 [32]
    Neither is correct. Nora is wrong; a circle is not a function because it fails the vertical line test. Mia's reason is wrong; a circle is not a function because the same x-value maps to multiple values of y.
16. AUG '18 [26]
    III and IV are functions. I has two y-values for $x = 6$, and II has two y-values for $x = 1$ and $x = 2$.

6.2 Function Graphs

1. JUN '14 [20] Ans: 1
2. AUG '18 [5] Ans: 1
3. AUG '18 [18] Ans: 1
4. JUN '21 [11] Ans: 4

6.3 Evaluate Functions

1. JUN '15 [15] Ans: 1
2. AUG '15 [12] Ans: 3
3. AUG '16 [5] Ans: 2
4. AUG '16 [11] Ans: 4
5. JAN '17 [10] Ans: 1
6. JUN '17 [5] Ans: 1
7. AUG '17 [4] Ans: 3
8. JUN '18 [2] Ans: 4
9. JUN '18 [8] Ans: 4
10. AUG '18 [11] Ans: 4
11. JAN '19 [2] Ans: 1
12. JAN '19 [21] Ans: 4
13. JUN '19 [2] Ans: 2
14. JAN '20 [1] Ans: 2
15. JUN '21 [3] Ans: 2
16. JUN '21 [15] Ans: 1
17. JUN '22 [2] Ans: 2
18. AUG '22 [1] Ans: 3
19. JAN '23 [4] Ans: 2

20. JAN '16 [32]
$f(5) = 8 \cdot 2^5 = 256$
$g(5) = 2^{5+3} = 2^8 = 256$
The functions are equal since they produce the same values for all inputs, *t*.
This is shown by the fact that
$8 \cdot 2^t = 2^3 \cdot 2^t = 2^{t+3}$

21. AUG '19 [25]
$g(-2) = -4(-2)^2 - 3(-2) + 2 = -8$

6.4 Features of Function Graphs

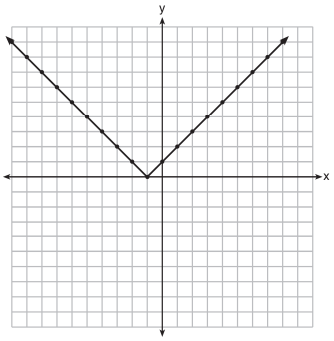
1. JUN '14 [9] Ans: 3
2. JAN '17 [21] Ans: 1
3. JUN '17 [1] Ans: 3
4. JUN '18 [20] Ans: 3

6.5 Domain and Range

1. JUN '14 [2] Ans: 4
2. JUN '14 [17] Ans: 4
3. AUG '14 [11] Ans: 1
4. AUG '14 [23] Ans: 2
5. JAN '15 [6] Ans: 2
6. JUN '15 [9] Ans: 4
7. JAN '16 [15] Ans: 1
8. JAN '16 [19] Ans: 2
9. JUN '16 [23] Ans: 4
10. AUG '16 [20] Ans: 2
11. JAN '17 [19] Ans: 4
12. AUG '17 [10] Ans: 1
13. JAN '18 [12] Ans: 3
14. JUN '18 [16] Ans: 3
15. JUN '18 [21] Ans: 2
16. AUG '18 [6] Ans: 2
17. JAN '19 [14] Ans: 2
18. JAN '19 [17] Ans: 4
19. JUN '19 [20] Ans: 4
20. AUG '19 [21] Ans: 4
21. JAN '20 [18] Ans: 1
22. JAN '20 [21] Ans: 4
23. JUN '21 [16] Ans: 2
24. JUN '22 [6] Ans: 2
25. AUG '22 [22] Ans: 2
26. JAN '23 [13] Ans: 4
27. JUN '14 [30]
yes, because each number in the domain leads to a unique number in the range
28. AUG '17 [29]
Since fractions of cookies may be eaten, the domain is continuous.
29. JUN '22 [29]
Domain is all real numbers. Range is $y \geq 3$.

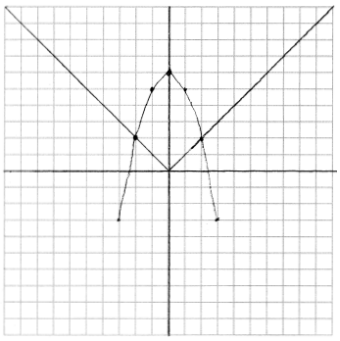
6.6 Absolute Value Functions

1. JUN ’16 [22] Ans: 2
2. JAN ’17 [12] Ans: 1
3. AUG ’17 [2] Ans: 2
4. AUG ’17 [18] Ans: 2
5. SEP '13 [10]



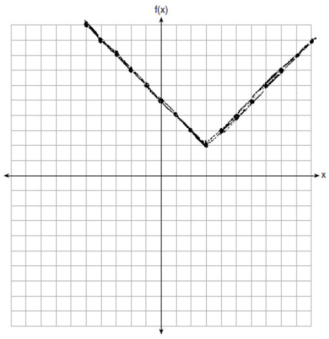
range $y \geq 0$; increasing for $x > -1$

6. JAN ’17 [33]

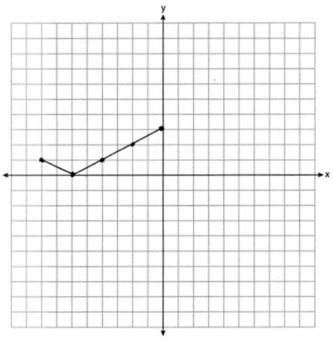


Yes, because the graph of $f(x)$ intersects the graph of $g(x)$ at $x = -2$.

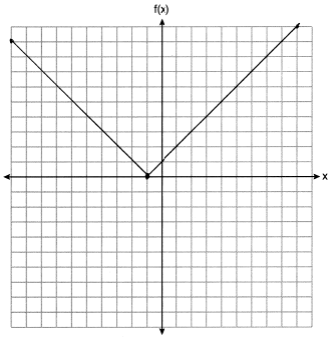
7. JAN ’18 [25]



8. JUN ’21 [26]



9. AUG ’22 [25]



Chapter 7. Functions as Models

7.1 Write a Function from a Table

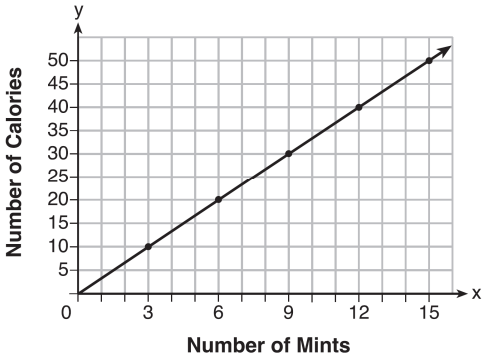
1. AUG '16 [4] Ans: 4
2. AUG '15 [25]
   $h(n) = 1.5(n-1) + 3$ or $h(n) = 1.5n + 1.5$
3. AUG '15 [32]

d	1	2	3	4		5
$T(d)$	30	32	34	36		38

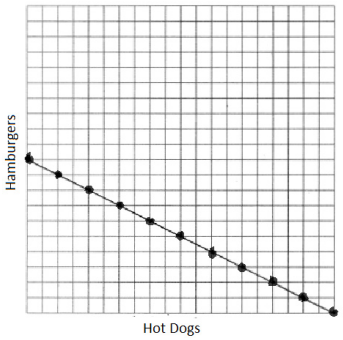
   $T(d) = 2(d-1) + 30$ or
   $T(d) = 2d + 28$
   $T(6) = 2(6) + 28 = 40$
4. JAN '17 [35]
   $m = \frac{9-7.50}{6-4} = 0.75$
   $f(x) = 0.75(x-4) + 7.50$
   $f(x) = 0.75x + 4.50$
   Each card costs 75¢ and start-up costs were $4.50.

7.2 Graph Linear Functions

1. SEP '13 [8]



   $C(x) = \frac{10}{3}x$
   $\frac{10}{3}x = 180$
   $10x = 540$
   $x = 54$
2. AUG '17 [37]
   7 sodas cost $3.50, so they have $25 left to spend on food.
   $1.25x + 2.5y = 25$



   There are 11 combinations, represented by the dots in the graph.

7.3 Rate of Change for Linear Functions

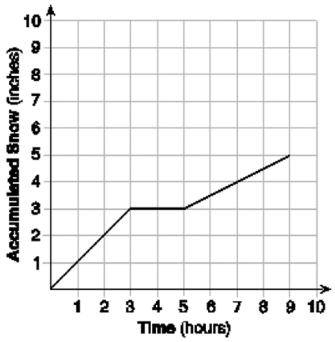
1. AUG '15 [2] Ans: 3
2. JAN '16 [2] Ans: 2
3. AUG '16 [15] Ans: 4
4. JUN '17 [4] Ans: 2
5. JAN '16 [29]
   The slope is the amount paid per month and the *y*-intercept is the initial cost.
6. JUN '16 [30]
   There are 2 inches of snow every 4 hours.
7. AUG '17 [33]
   a) 10 hrs.
   $55(4) + 65(t - 4) = 610$
   $220 + 65t - 260 = 610$
   $65t = 650$
   $t = 10$
   b) 0.3 hrs.
   $55(2) + 65(t - 2) = 610$
   $110 + 65t - 130 = 610$
   $65t = 630$
   $t \approx 9.7$
   $10 - 9.7 = 0.3$

7.4 Average Rate of Change

1. MAY '13 [1] Ans: 4
2. JUN '14 [18] Ans: 1
3. AUG '14 [14] Ans: 4
4. JAN '15 [21] Ans: 1
5. JUN '15 [11] Ans: 3
6. AUG '15 [15] Ans: 1
7. JAN '16 [13] Ans: 4
8. JUN '16 [3] Ans: 1
9. AUG '16 [1] Ans: 1
10. AUG '17 [5] Ans: 2
11. JAN '18 [24] Ans: 2
12. JUN '21 [5] Ans: 2
13. JAN '16 [28]
    from 1960–1965, because the decrease of 0.15 degrees is the largest change among the intervals (it has the steepest slope)
14. JAN '17 [31]
    $\frac{480-140}{7-2} = 68$ mph
15. JAN '18 [36]
    The domain may include fractions of hours, and the number of hours cannot be negative; $0 < t < 6$;
    $\frac{0-120}{14-6} = -\frac{120}{8} = -15$; the business sold 15 less pairs of shoes per hour
16. AUG '18 [27]
    $\frac{3.41-6.26}{9-3} = -0.475$
17. JUN '19 [29]
    $\frac{33-1}{12-1} \approx 2.9$ and $\frac{36-11}{15-6} \approx 2.8$, so the interval from 1 a.m. to 12 noon has the greater rate.
18. JUN '22 [27]
    $\frac{100-40}{4-1} = 20$ dollars per hour

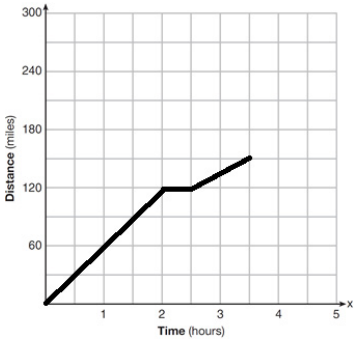
7.5 Functions of Time

1. JUN '15 [2] Ans: 4
2. AUG ’19 [18] Ans: 1
3. MAY ’13 [7]



3.5

4. AUG '15 [28]



5. JUN ’16 [35]

762 – 192 = 570 miles

92 – 32 = 60 minutes

$\frac{570}{60} = 9.5$ miles per minute

$y = 9.5x$

$192 + 9.5(120 - 32) = 1028$ miles

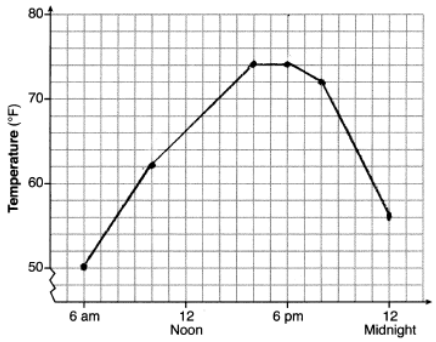
6. JUN ’17 [34]

D to *E* because his speed was slower; Craig may have stopped to eat; $\frac{230}{7} \approx$ 32.9 mph

7. JAN ’19 [28]

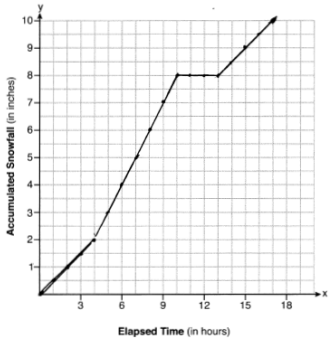
$2 < t < 6$ and $14 < t < 15$ because horizontal lines have a slope of zero.

8. JAN ’19 [36]



6 am to 4 pm; $\frac{74-56}{6-12} = -3$

9. AUG ’19 [36]



$\frac{10.0-0}{17.0-0} \approx 0.59$

10. JUN ’22 [33]

The zeros represent when the height is 0, meaning that the kite is on the ground. The height is increasing over the intervals $0 < x < 0.5$ and $1 < x < 2$ minutes. The maximum height is 60 ft.

11. AUG ’22 [33]

The bus stopped between *D* and *E*. The bus traveled fastest between *C* and *D* at 60 mph. The average rate of speed was $\frac{140}{4} = 35$ mph.

12. JAN ’23 [33]

$[20, 30]$; 10,000; $\frac{4000-10000}{40-30} = -600$; The population decreases by 600 each year.

7.6 Systems of Functions

1. JAN '16 [17] Ans: 1
2. AUG '18 [19] Ans: 3
3. AUG '19 [14] Ans: 3
4. SEP '13 [15]
   $f(x) = 120x$ and $g(x) = 70x + 1600$
   $120x = 70x + 1600$
   $50x = 1600$
   $x = 32$
   $f(35) = 4200$, $g(35) = 4050$, so Green Thumb is less expensive
5. MAY '13 [8]
   $A(x) = 1.50x + 6$ and $B(x) = 2x + 2.50$
   $1.50x + 6 = 2x + 2.50$
   $3.50 = 0.50x$
   $7 = x$, so 7 rides
   $A(5) = 1.50(5) + 6 = 13.50$ and
   $B(5) = 2(5) + 2.50 = 12.50$, so B has a lower cost.
6. AUG '14 [27]
   $185 + 0.03x = 275 + 0.025x$
   $0.005x = 90$
   $x = 18{,}000$
7. JAN '15 [31]
   $36 + 15x = 48 + 10x$
   $5x = 12$
   $x = 2.4$
8. AUG '16 [30]
   –3 and 1, because the two functions intersect at (– 3,4) and (1,3).

7.7 Combine Functions

1. AUG '14 [6] Ans: 2
2. JUN '16 [25]
   $g(x) = 2(2x + 1)^2 - 1$
   $= 2(4x^2 + 4x + 1) - 1$
   $= 8x^2 + 8x + 2 - 1$
   $= 8x^2 + 8x + 1$

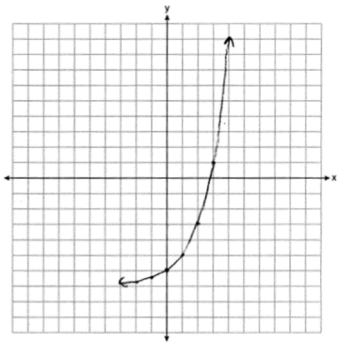
Chapter 8. Exponential Functions

8.1 Exponential Growth and Decay

1. JAN '15 [4] Ans: 1
2. JAN '15 [8] Ans: 1
3. JUN '15 [17] Ans: 2
4. AUG '15 [7] Ans: 3
5. JAN '16 [3] Ans: 3
6. JAN '16 [8] Ans: 4
7. JUN '16 [17] Ans: 2
8. AUG '16 [17] Ans: 1
9. AUG '16 [24] Ans: 2
10. JAN '17 [24] Ans: 3
11. JUN '17 [12] Ans: 2
12. AUG '17 [14] Ans: 2
13. AUG '17 [16] Ans: 2
14. AUG '17 [21] Ans: 3
15. JAN '18 [2] Ans: 3
16. JAN '19 [12] Ans: 4
17. JUN '19 [23] Ans: 2
18. JAN '20 [2] Ans: 1
19. JAN '20 [14] Ans: 2
20. JUN '22 [21] Ans: 3
21. AUG '22 [9] Ans: 3
22. JAN '23 [11] Ans: 3
23. JUN '14 [26]
    rate of decay; number of milligrams of the substance at the start
24. AUG '14 [26]
    $B = 3000(1.042)^t$
25. JUN '15 [29]
    $600(1.016)^2 \approx 619.35$
26. AUG '15 [30]
    5%; in the decay function $y = a(1 - r)^x$, r represents the percent of change, $1 - r = 0.95$, so $r = 0.05 = 5\%$
27. JUN '17 [28]
    15%; in the decay function $y = a(1 - r)^x$, r represents the percent of change, $1 - r = 0.85$, so $r = 0.15 = 15\%$
28. JUN '18 [33]
    There are 20 rabbits at the start, and their population is growing at 1.4% per day.
    $\frac{p(100) - p(50)}{100 - 50} \approx 0.8$
29. AUG '18 [34]
    $V(t) = 25000(0.815)^t$
    $V(3) - V(4) \approx 2503.71$
30. JAN '19 [33]
    $V = 450(1.025)^t$
    No, because $(1.025)^{20} < 2$.
31. AUG '19 [34]
    $A(t) = 5000(1.012)^t$
    $A(32) - A(17) \approx 1200$

8.2 Graphs of Exponential Functions

1. AUG '14 [10] Ans: 3
2. JAN '15 [15] Ans: 3
3. JUN '19 [16] Ans: 2
4. JAN '15 [32]
   $y = 0.25(2)^x$, by entering (*x*,*y*) coordinates, for integer values of *x* from 2 to 5, into calculator, then STAT / ExpReg
5. JUN '15 [36]
   $y = 80(1.5)^x$; 3,030,140; No, because the number would grow so large it would be more than the number of potential customers
6. JAN '19 [29]



Yes, $f(4) > g(4)$ because $2^4 - 7 > 1.5(4) - 3$.

8.3 Rewrite Exponential Expressions

1. JAN '15 [19] Ans: 4
2. JUN '15 [13] Ans: 2
3. JUN '16 [14] Ans: 3
4. JAN '17 [14] Ans: 2
5. JAN '18 [21] Ans: 4
6. AUG '18 [1] Ans: 2
7. JAN '19 [23] Ans: 4
8. AUG '19 [13] Ans: 2
9. JAN '20 [19] Ans: 3
10. JUN '21 [14] Ans: 3
11. JUN '22 [9] Ans: 3
12. AUG '22 [18] Ans: 4
13. JAN '23 [9] Ans: 2

8.4 Compare Linear and Exponential Functions

1. JUN '14 [6] Ans: 4
2. JUN '14 [15] Ans: 3
3. AUG '14 [12] Ans: 3
4. JAN '15 [5] Ans: 3
5. AUG '15 [18] Ans: 3
6. JAN '16 [16] Ans: 4
7. JAN '16 [23] Ans: 1
8. JUN '16 [6] Ans: 1
9. JUN '16 [21] Ans: 3
10. AUG '16 [18] Ans: 1
11. JAN '17 [11] Ans: 3
12. JUN '17 [7] Ans: 1
13. JUN '17 [21] Ans: 3
14. AUG '17 [17] Ans: 1
15. JAN '18 [5] Ans: 1
16. JUN '18 [14] Ans: 4
17. AUG '18 [2] Ans: 1
18. AUG '18 [23] Ans: 4
19. JAN '19 [16] Ans: 3
20. JUN '19 [6] Ans: 1
21. JUN '19 [11] Ans: 3
22. AUG '19 [7] Ans: 2
23. JAN '20 [17] Ans: 3
24. JUN '21 [17] Ans: 4
25. JUN '22 [8] Ans: 3
26. AUG '22 [13] Ans: 2

27. JAN ’23 [8] Ans: 1
28. JAN ’23 [16] Ans: 2
29. SEP '13 [13]
    $y = 836.47(2.05)^x$; The data appear to grow at an exponential rate; $y = 836.47(2.05)^2 \approx 3515$
30. JUN '14 [35]
    $A(n) = 175 - 2.75n$
    $175 - 2.75n = 0$
    $n = 63.\overline{63}$
    63 weeks; she won't have enough money for 64 rentals
31. AUG '15 [27]
    exponential; the function does not grow at a constant rate; it is close to a function with a common ratio of 1.25.
32. JAN '16 [25]
    linear; there is a constant rate of change (a slope of –1.25).
33. AUG ’16 [27]
    exponential, because the function does not grow at a constant rate.
34. JUN ’17 [36]
    $f(x) = 100x + 10$ and $g(x) = 10(2)^x$
    Both, since $f(7) = 100(7) + 10 = 710$ and $g(7) = 10(2)^7 = 1280$.
35. JUN ’18 [26]
    Yes, because $f(x)$ does not have a constant rate of change.
36. JAN ’19 [26]
    Linear, because the function grows at a constant rate ($d = 87$).
37. JUN ’21 [29]
    No, Mike would be correct for a linear function, but not for an exponential function.
38. AUG ’22 [26]
    Exponential, because it does not decrease at a constant rate ($r \approx 0.53$).

Chapter 9. Sequences

9.1 Arithmetic Sequences

1. JUN '14 [24] Ans: 2
2. AUG '14 [16] Ans: 2
3. JUN ’16 [13] Ans: 3
4. JUN ’18 [7] Ans: 1
5. AUG ’18 [20] Ans: 4
6. JUN ’19 [19] Ans: 2
7. JAN ’20 [8] Ans: 2
8. JUN ’21 [18] Ans: 4
9. JUN ’22 [15] Ans: 3
10. JAN ’23 [28]

    $d = \frac{15-3}{4-1} = \frac{12}{3} = 4$

9.2 Geometric Sequences

1. AUG ’19 [24] Ans: 1
2. AUG ’22 [2] Ans: 1
3. JAN ’23 [17] Ans: 1
4. AUG ’17 [26]

    Yes, because the sequence has a common ratio, 3.

Chapter 10. Irrational Numbers

10.1 Simplifying Radicals

There are no Regents exam questions on this topic.

10.2 Operations with Radicals

There are no Regents exam questions on this topic.

10.3 Rationalizing Denominators

There are no Regents exam questions on this topic.

10.4 Closure

1. JUN '14 [13] Ans: 3
2. AUG '14 [1] Ans: 1
3. JUN '15 [8] Ans: 2
4. AUG '15 [22] Ans: 2
5. JAN '16 [4] Ans: 1
6. JAN '18 [8] Ans: 3
7. JAN '19 [3] Ans: 3
8. JUN '19 [7] Ans: 1
9. JUN '21 [9] Ans: 3
10. JAN '15 [25]
    correct; 4.2 is rational and $\sqrt{2}$ is irrational, and the sum of a rational and irrational is always irrational
11. JUN '16 [26]
    $3\sqrt{2} \cdot 8\sqrt{18} = 24\sqrt{36} = 24(6) = 144$
    144 is an integer and all integers are rational.
12. AUG '16 [29]
    The sum is $7\sqrt{2}$, which is irrational. 7 is rational and $\sqrt{2}$ is irrational, and the product of a rational and irrational is always irrational.
13. JAN '17 [28]
    No. The second fraction is irrational because it is the quotient of an irrational and a rational. The sum is irrational because it is the sum of a rational and an irrational.
14. JUN '17 [27]
    Irrational. 7 is rational and $\sqrt{2}$ is irrational, and the difference of a rational and irrational is always irrational.
15. AUG '17 [25]
    a is irrational. *b* and *c* are rational (*c* = 15). *a* + *b* is irrational because the sum of a rational and irrational is always irrational, and *b* + *c* is rational because the sum of two rationals is always rational.
16. JUN '18 [31]
    Rational; $\sqrt{16} = 4$, so it is rational, and $\frac{4}{7}$ is a ratio of two integers, so it is also rational. The product of two rationals is always rational. (The product is $\frac{16}{7}$.)

17. AUG ’19 [30]
    No. For example, the product of irrational numbers $\sqrt{2}$ and $\sqrt{8}$ is $\sqrt{16}$, which is the rational number 4.
18. JAN ’20 [30]
    Product is irrational. $\sqrt{3}$ is irrational and $\sqrt{9} = 3$ is rational, and the product of an irrational number and a rational number is always irrational.
19. JUN ’22 [25]
    Product is –108.8, which is rational. $\sqrt{1024} = 32$ and -3.4 are both rational, and the product of two rational numbers is always rational.
20. AUG ’22 [27]
    Product is rational. Both $\sqrt{8} = 2\sqrt{2}$ and $\sqrt{98} = 7\sqrt{2}$ are irrational, so this alone tells us nothing about the product. However, $2\sqrt{2} \cdot 7\sqrt{2} = 14 \cdot 2 = 28$, which is rational.
21. JAN ’23 [29]
    $11\sqrt{3} + 3\sqrt{3} = 14\sqrt{3}$, which is irrational (the sum of two irrationals is always irrational);
    $(11\sqrt{3})(3\sqrt{3}) = 99$, which is rational

Chapter 11. Factoring

11.1 Factor Out the Greatest Common Factor

There are no Regents exam questions on this topic.

11.2 Factor a Trinomial

1. AUG '14 [15] Ans: 1
2. JUN '18 [10] Ans: 1
3. AUG '18 [3] Ans: 3
4. JAN '20 [12] Ans: 4
5. JUN '22 [4] Ans: 4
6. AUG '14 [25]
   $(x + 6)(x + 4)$ or $(x + 4)(x + 6)$, so 4 and 6

11.3 Factor the Difference of Perfect Squares

1. JUN '15 [3] Ans: 2
2. JUN '16 [1] Ans: 3
3. JUN '17 [6] Ans: 3
4. AUG '17 [3] Ans: 3
5. JAN '18 [9] Ans: 3
6. AUG '18 [7] Ans: 3
7. JUN '19 [1] Ans: 4
8. AUG '19 [8] Ans: 3
9. AUG '22 [3] Ans: 3

11.4 Factor Completely

1. JAN '15 [22] Ans: 3
2. JAN '16 [12] Ans: 3
3. AUG '16 [8] Ans: 2
4. JAN '17 [1] Ans: 2
5. AUG '19 [16] Ans: 3
6. JAN '20 [6] Ans: 3
7. JAN '20 [16] Ans: 2
8. JAN '23 [14] Ans: 1
9. JUN '14 [31]
   $(x^2 + 7)(x^2 - 1) =$
   $(x^2 + 7)(x + 1)(x - 1)$
10. JUN '21 [28]
    $(x^2 + 4)(x^2 - 4) =$
    $(x^2 + 4)(x + 2)(x - 2)$
11. JUN '22 [31]
    $x^2(x^2 - 36) = x^2(x + 6)(x - 6)$
12. AUG '22 [32]
    $3(y^2 - 4y - 96) = 3(y + 8)(y - 12)$
13. JAN '23 [31]
    $x(4x^2 - 49) = x(2x + 7)(2x - 7)$

Chapter 12. Quadratic Functions

12.1 Solve Simple Quadratic Equations

1. JUN '14 [23] Ans: 1
2. AUG '14 [3] Ans: 3
3. JAN '15 [16] Ans: 1
4. JUN '15 [19] Ans: 2
5. JAN '17 [15] Ans: 4
6. SEP '13 [6]

   $\frac{1}{2}x^2 - 4 = 0$

   $x^2 - 8 = 0$

   $x^2 = 8$

   $x = \pm 2\sqrt{2}$
7. AUG '15 [35]

   $r = \sqrt{\frac{V}{\pi h}}$

   $d = 2r = 2\sqrt{\frac{V}{\pi h}} = 2\sqrt{\frac{66}{3.3\pi}} \approx 5$
8. JUN '16 [33]

   a) $H(1) = -16(1)^2 + 144 = 128$

   $H(2) = -16(2)^2 + 144 = 80$

   $128 - 80 = 48$ ft.

   b) $0 = -16t^2 + 144$

   $16t^2 = 144$

   $t^2 = 9$

   $t = \pm 3$

   3 secs (reject –3)
9. AUG '17 [27]

   $V = \frac{1}{3}\pi r^2 h$

   $3V = \pi r^2 h$

   $\frac{3V}{\pi h} = r^2$

   $r = \sqrt{\frac{3V}{\pi h}}$

   (reject negative radius)
10. JAN '18 [30]

    $r^2 = \frac{GM_1M_2}{F_g}$

    $r = \sqrt{\frac{GM_1M_2}{F_g}}$
11. JAN '19 [32]

    $4x^2 = 80$

    $x^2 = 20$

    $x = \pm\sqrt{20}$
12. JUN '19 [28]

    $5x^2 = 180$

    $x^2 = 36$

    $x = \pm 6$
13. AUG '19 [31]

    $6x^2 = 42$

    $x^2 = 7$

    $x = \pm\sqrt{7}$

12.2 Solve Quadratic Equations by Factoring

1. JUN '15 [10] Ans: 4
2. AUG '15 [13] Ans: 4
3. JAN '16 [9] Ans: 1
4. JUN '16 [12] Ans: 1
5. JAN '17 [2] Ans: 3
6. JUN '18 [4] Ans: 3
7. JUN '14 [33]

   $m(x) = 9x - 3x^2 - 3 + x + 4x^2 + 19$

   $m(x) = x^2 + 10x + 16$

   $x^2 + 10x + 16 = 0$

   $(x + 8)(x + 2) = 0$

   $\{-8, -2\}$

8. JAN '16 [27]
$y^2 - 6y + 9 = 4y - 12$
$y^2 - 10y + 21 = 0$
$(y - 3)(y - 7) = 0$
$\{3,7\}$

9. AUG '16 [36]
$0 = (B + 3)(B - 1)$
$0 = (8x + 3)(8x - 1)$
$\left\{-\frac{3}{8}, \frac{1}{8}\right\}$
Janice substituted *B* for 8*x*, resulting in a simpler quadratic to factor. Once factored, she could replace the 8*x* for *B*.

10. JAN '18 [26]
$x^2 - 4x + 3 = 0$
$(x - 1)(x - 3) = 0$
$\{1,3\}$

11. JAN '19 [27]
$x^2 - 8x - 9 = 0$
$(x - 9)(x + 1) = 0$
$\{9, -1\}$
I factored the trinomial.

12.3 Find Quadratic Equations from Given Roots

1. MAY '13 [3] Ans: 2
2. JUN '14 [12] Ans: 3

12.4 Equations with the Square of a Binomial

1. AUG '14 [18] Ans: 4
2. JUN '15 [21] Ans: 1
3. AUG '15 [23] Ans: 3
4. JUN '16 [19] Ans: 3
5. JAN '18 [14] Ans: 1
6. JAN '20 [15] Ans: 3
7. AUG '16 [31]
$(x - 3)^2 - 49 = 0$
$(x - 3)^2 = 49$
$x - 3 = \pm 7$
$x = 3 \pm 7$
$\{-4,10\}$

12.5 Complete the Square

1. JUN '14 [8] Ans: 2
2. JUN '14 [10] Ans: 2
3. JAN '15 [17] Ans: 4
4. JUN '15 [23] Ans: 1
5. AUG '15 [20] Ans: 1
6. JAN '16 [14] Ans: 2
7. JAN '17 [22] Ans: 1
8. JUN '17 [22] Ans: 2
9. JUN '18 [12] Ans: 3
10. JAN '19 [15] Ans: 1
11. AUG '22 [15] Ans: 1
12. JAN '23 [19] Ans: 4
13. AUG '14 [32]
$9, c = \left(\frac{b}{2}\right)^2 = \left(\frac{6}{2}\right)^2 = 9$
14. AUG '17 [32]
$x^2 - 6x + 9 = 15 + 9$
$(x - 3)^2 = 24$
$x - 3 = \pm\sqrt{24}$
$x = 3 \pm 2\sqrt{6}$
15. AUG '18 [30]
$x^2 + 4x + 4 = 2 + 4$
$(x + 2)^2 = 6$
$x + 2 = \pm\sqrt{6}$
$x = -2 \pm \sqrt{6}$

16. JAN '20 [31]

$x^2 - 8x = -6$

$x^2 - 8x + 16 = -6 + 16$

$(x-4)^2 = 10$

$x - 4 = \pm\sqrt{10}$

$x = 4 \pm \sqrt{10}$

17. JUN '22 [32]

$x^2 - 8x = 5$

$x^2 - 8x + 16 = 5 + 16$

$(x-4)^2 = 21$

$x - 4 = \pm\sqrt{21}$

$x = 4 \pm \sqrt{21}$

12.6 Quadratic Formula and the Discriminant

1. SEP '13 [2] Ans: 1
2. JUN '18 [22] Ans: 3
3. JUN '19 [21] Ans: 2
4. AUG '15 [29]

   no real solutions; the discriminant $b^2 - 4ac = (-2)^2 - 4(1)(5) = -16$ is negative
5. JAN '16 [34]

   completing the square or quadratic formula;

   $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-16 \pm \sqrt{16^2-4(4)(9)}}{2(4)}$

   $\approx -2 \pm 1.3 \approx \{-3.3, -0.7\}$
6. JUN '17 [35]

   $2x^2 + 3x + 10 = 4x + 32$

   $2x^2 - x - 22 = 0$

   $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{1 \pm \sqrt{(-1)^2-4(2)(-22)}}{2(2)}$

   $\approx 0.25 \pm 3.33 \approx \{-3.1, 3.6\}$

   Chose the quadratic formula because the equation could not be solved by factoring, and completing the square would require fractions.
7. JUN '18 [27]

   $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-1 \pm \sqrt{1^2-4(1)(-5)}}{2(1)}$

   $\approx 0.5 \pm 2.29 \approx \{-2.8, 1.8\}$
8. AUG '18 [28]

   Irrational, since the discriminant $b^2 - 4ac = 3^2 - 4(2)(-10) = 89$ is not a perfect square.
9. JAN '23 [30]

   $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{4 \pm \sqrt{(-4)^2-4(1)(1)}}{2(1)}$

   $\approx 2 \pm 1.73 \approx \{0.27, 3.73\}$

12.7 Word Problems – Quadratic Equations

1. AUG '14 [9] Ans: 3
2. JUN '16 [24] Ans: 2
3. AUG '17 [23] Ans: 4
4. JUN '14 [34]
   $(2x + 16)(2x + 12) = 396$, the length of the garden plus walkway times the width of the garden plus walkway,
   $4x^2 + 56x - 204 = 0$
   $4(x^2 + 14x - 51) = 0$
   $4\cancel{(x + 17)}(x - 3) = 0$
   width = 3 m
5. AUG '14 [36]
   $x(x + 40) = 6000$
   $x^2 + 40x - 6000 = 0$
   $\cancel{(x + 100)}(x - 60) = 0$
   60 and 100
6. JAN '15 [37]
   $(2x)(x - 3) = 1.25x^2$; the product of the new length and width give an area that is 1.25 larger;
   $2x^2 - 6x = 1.25x^2$
   $0.75x^2 - 6x = 0$
   $x(0.75x - 6) = 0$
   $\cancel{x = 0}$ or $x = 8$
   $1.25(8)^2 = 80$
   80 square meters
7. JUN '15 [27]
   $60 + 5x = x^2 + 46$
   $0 = x^2 - 5x - 14$
   $0 = (x + 2)(x - 7)$
   $\cancel{x = -2}$ or $x = 7$
   Set the equations equal and solve for a positive *x*.
8. JUN '15 [32]
   $w(2w) = 34$
   $2w^2 = 34$
   $w^2 = 17$
   $w = \sqrt{17} \approx 4.1$
9. AUG '15 [31]
   $0 \le t \le 4$, the roots 0 and 4 represent the start time and when it hits the ground in 4 seconds
10. AUG '15 [37]
    $(2x + 8)(2x + 6) = 100$
    $4x^2 + 28x - 52 = 0$
    $x^2 + 7x - 13 = 0$
    If *x* is the width of the frame, add 2*x* to each dimension to account for both sides, then multiply to find the area
    $x = \frac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2(1)} = \cancel{-8.5}$ or 1.5
11. JAN '16 [36]
    $\text{width} = \frac{48 - 2x}{2} = 24 - x$
    $x(24 - x) = 108$
    $24x - x^2 = 108$
    $-x^2 + 24x - 108 = 0$
    $x^2 - 24x + 108 = 0$
    $(x - 6)(x - 18) = 0$
    $\{6,18\}$ dimensions are 6 and 18 meters
12. JUN '18 [29]
    $-16t^2 + 256 = 0$
    $16t^2 = 256$
    $t^2 = 16$
    $t = 4$ (reject –4)

13. JAN '20 [36]

length $= \frac{w}{2} + 6$

$w\left(\frac{w}{2} + 6\right) = 432$

$\frac{w^2}{2} + 6w = 432$

$2\left[\frac{w^2}{2}\right] + 2[6w] = 2[432]$

$w^2 + 12w = 864$

$w^2 + 12w + 36 = 864 + 36$

$(w + 6)^2 = 900$

$w + 6 = \pm 30$

$w = -6 \pm 30$

width $w = 24$ (reject $w = -36$)

length $= \frac{24}{2} + 6 = 18$

Chapter 13. Parabolas

13.1 Find Roots Given a Parabolic Graph

1. MAY '13 [2] Ans: 3
2. AUG '14 [5] Ans: 4
3. JAN '17 [6] Ans: 4
4. JAN '19 [9] Ans: 3
5. JUN '19 [18] Ans: 3
6. AUG '22 [7] Ans: 3
7. JUN '17 [33]
   $x^2 + 3x - 18 = 0$
   $(x + 6)(x - 3) = 0$
   $\{-6,3\}$
   The zeros are the *x*-intercepts on the graph of $r(x)$.
8. JAN '18 [32]
   yes, because the *x*-intercepts (roots) are –2 and 3.

13.2 Find Vertex and Axis Graphically

There are no Regents exam questions on this topic.

13.3 Finding Vertex and Axis Algebraically

1. JUN '15 [14] Ans: 3
2. AUG '15 [21] Ans: 4
3. JAN '16 [22] Ans: 3
4. JUN '16 [11] Ans: 2
5. JAN '18 [23] Ans: 2
6. JUN '18 [13] Ans: 2
7. AUG '19 [17] Ans: 3
8. AUG '19 [23] Ans: 4
9. JAN '23 [20] Ans: 1
10. AUG '14 [29]
    the vertex for *f* is (1,6) so the maximum is 6;
    for the vertex of g,
    $x = \frac{-4}{2\left(-\frac{1}{2}\right)} = 4$
    $y = -\frac{1}{2}(4)^2 + 4(4) + 3 = 11$
    the vertex is $(4,11)$ so the maximum is 11; therefore, $g(x)$ has the larger maximum
11. JAN '16 [33]
    $t = \frac{-64}{2(-16)} = 2$
    maximum at the vertex where $t = 2$ seconds;
    $-16t^2 + 64t + 80 = 0$
    $-16(t^2 - 4t - 5) = 0$
    $-16(t + 1)(t - 5) = 0$
    $t = 5$ (reject –1)
    decreases from the vertex until it hits the ground at $h(t) = 0$, or when $2 < t < 5$

12. AUG '17 [36]

$x = \frac{-128}{2(-16)} = 4$

$h(4) = -16(4)^2 + 128(4) + 9000 = 9256$

$(4, 9256)$ The y-coordinate is the pilot's maximum height above the ground after being ejected.

$9256 - 9000 = 256$, so she was 256 feet above the aircraft.

13. JAN '18 [29]

$(x + 3)(x - 5) = 0$

$x^2 - 2x - 15 = 0$

$x = \frac{-(-2)}{2(1)} = 1$

(Alternate solution: $x = \frac{-3+5}{2} = 1$)

14. JUN '21 [36]

height is 112 ft.

$t = \frac{-96}{2(-16)} = 3$

$f(3) = -16(3)^2 + 96(3) + 112 = 256$

Vertex is $(3, 256)$; The ball reaches a maximum height of 256 ft. after 3 secs.

$-16t^2 + 96t + 112 = 0$

$t^2 - 6t - 7 = 0$

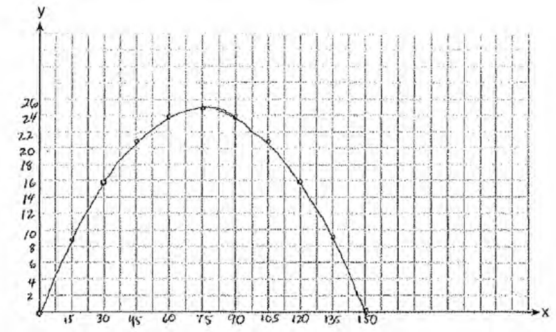
$(t - 7)(t + 1) = 0$

$t = 7$ (reject $t = -1$)

The height decreases over $3 < t < 7$.

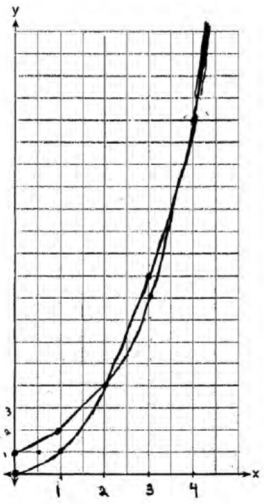
13.4 Graph Parabolas

1. AUG '16 [13] Ans: 3
2. JUN '17 [24] Ans: 1
3. JAN '18 [11] Ans: 2
4. JAN '19 [13] Ans: 1
5. JUN '19 [14] Ans: 3
6. AUG '19 [10] Ans: 1
7. JAN '20 [13] Ans: 2
8. JAN '23 [15] Ans: 2
9. JUN '15 [37]



(75,25), maximum height of 25 feet at a distance of 75 feet; no, 45 yds = 135 ft and $h(135) = 9$.

10. AUG '15 [33]

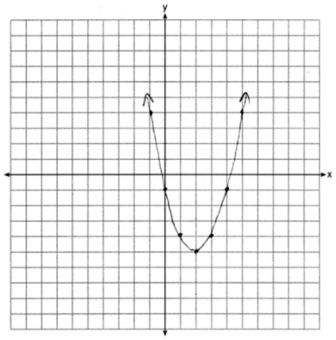


$f(20) = 400$ and $g(20) = 1{,}048{,}576$, so $g(x)$ is greater

11. JUN '16 [27]

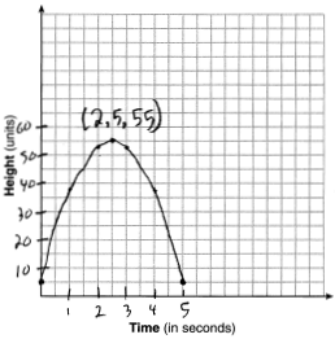
$x = \frac{-(-4)}{2(1)} = 2$

$y = (2)^2 - 4(2) - 1 = -5$



$x = 2$

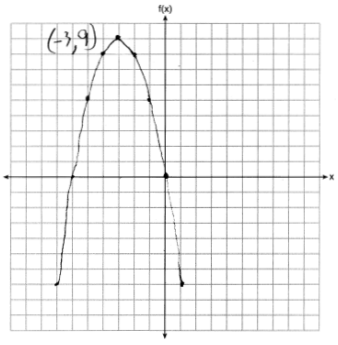
12. JAN '17 [36]



(2.5,55)

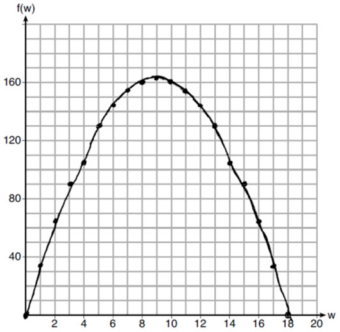
The ball reaches a maximum height of 55 units at 2.5 seconds.

13. JUN '17 [26]



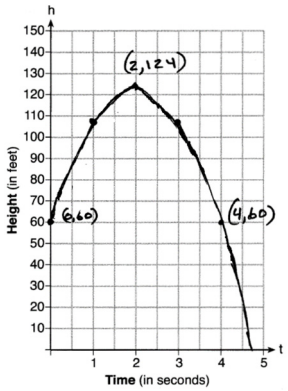
(−3,9)

14. AUG '18 [36]



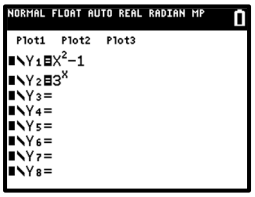
If the width is 9 ft, its area is 162 ft^2.

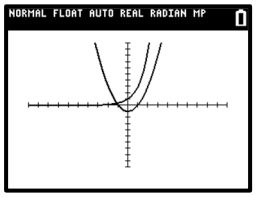
15. JAN '20 [33]

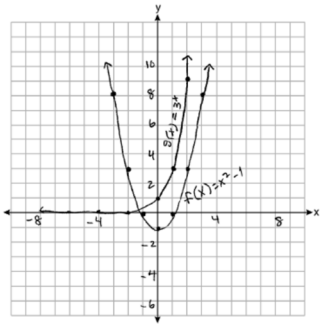


$\frac{124-60}{2-0} = 32$ ft/sec

16. JUN '22 [34]







$f(x) = g(x)$ for one value of x because there is one point of intersection.

13.5 Vertex Form

1. JAN '16 [1] Ans: 2
2. JAN '16 [7] Ans: 4
3. JUN '16 [16] Ans: 3
4. JUN '17 [17] Ans: 3
5. AUG '19 [11] Ans: 1
6. JUN '19 [32]

   $y = x^2 - 2x - 8$

   $y + 8 = x^2 - 2x$

   $y + 8 + 1 = x^2 - 2x + 1$

   $y + 9 = (x - 1)^2$

   $y = (x - 1)^2 - 9$

   Vertex is $(1, -9)$

7. JUN '21 [30]

   $y = x^2 - 14x - 15$

   $y + 15 = x^2 - 14x$

   $y + 15 + 49 = x^2 - 14x + 49$

   $y + 64 = (x - 7)^2$

   $y = (x - 7)^2 - 64$

   Vertex is $(7, -64)$

Chapter 14. Quadratic-Linear Systems

14.1 Solve Quadratic-Linear Systems Algebraically

1. AUG '15 [17] Ans: 2
2. JAN '19 [18] Ans: 3
3. JAN '23 [12] Ans: 4
4. JUN '17 [31]

   $x^2 = x$

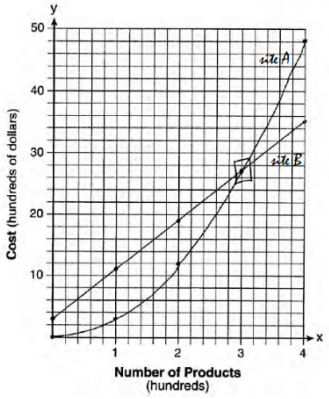
   $x^2 - x = 0$

   $x(x - 1) = 0$

   $\{0,1\}$

14.2 Solve Quadratic-Linear Systems Graphically

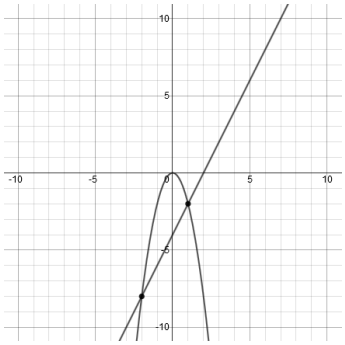
1. JAN '17 [23] Ans: 2
2. JAN '18 [10] Ans: 3
3. JUN '22 [16] Ans: 4
4. JUN '14 [37]



3 because the graphs intersect where $x = 3$;

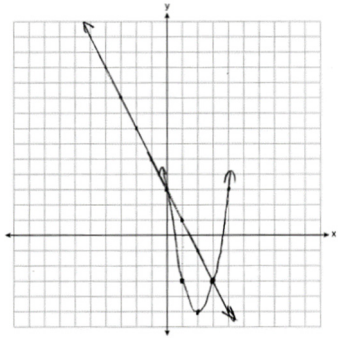
site A because the costs $A(x) < B(x)$ at $x = 2$

5. AUG '14 [35]



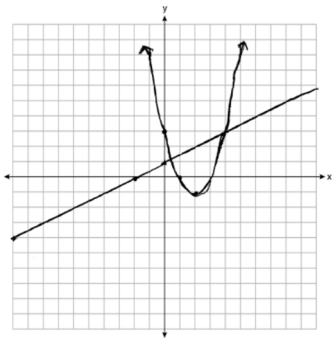
−2 and 1

6. JUN '19 [34]



0 and 3

7. AUG '22 [34]



$x = 0.5$ or $x = 4$, because these are the values of x where the graphs intersect.

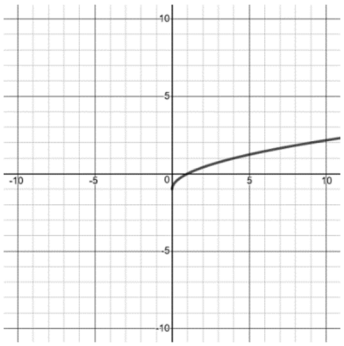
Chapter 15. Cubic and Radical Functions

15.1 Cubic Functions

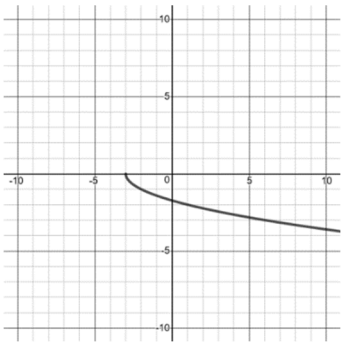
1. JAN '15 [24] Ans: 1
2. JUN '15 [12] Ans: 2
3. AUG '15 [4] Ans: 1
4. AUG ’16 [23] Ans: 1
5. JUN ’17 [10] Ans: 3
6. AUG ’17 [7] Ans: 1
7. AUG ’17 [19] Ans: 3
8. JAN ’18 [6] Ans: 4
9. JUN ’18 [18] Ans: 2
10. JUN ’19 [8] Ans: 3
11. JAN ’20 [9] Ans: 2
12. JUN ’21 [12] Ans: 1
13. JAN ’23 [22] Ans: 3
14. AUG ’18 [25]
    Set each factor equal to zero and solve for x, or graph the function and find the x-intercepts. $-3, 1, 8$.
15. JAN ’19 [30]
    $3x^3 + 21x^2 + 36x = 0$
    $3x(x^2 + 7x + 12) = 0$
    $3x(x + 4)(x + 3) = 0$
    $\{0, -4, -3\}$

15.2 Square Root Functions

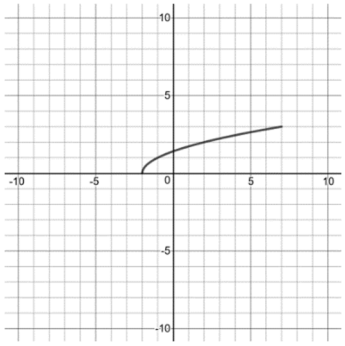
1. JUN ’17 [3] Ans: 4
2. AUG ’22 [14] Ans: 2
3. JUN '14 [25]



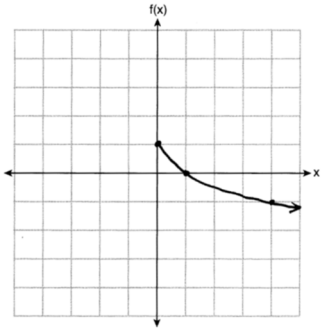
4. AUG ’16 [25]



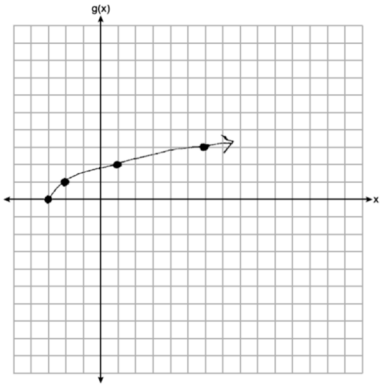
5. JUN ’18 [25]



6. JAN ’20 [25]



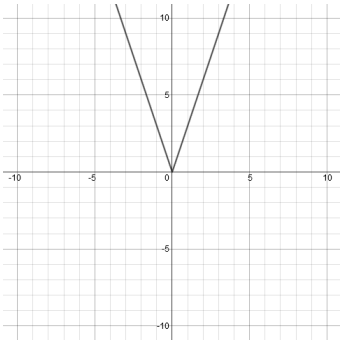
7. JAN ’23 [25]



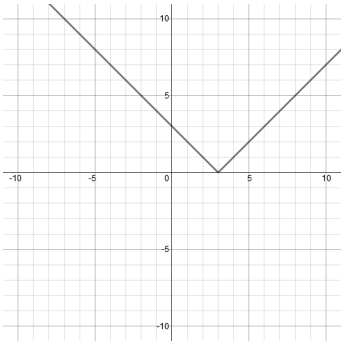
Chapter 16. Transformations of Functions

16.1 Translations

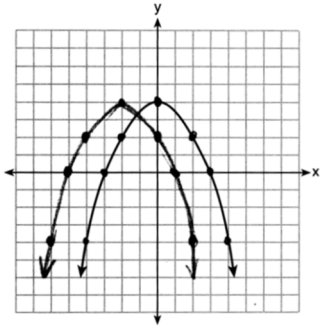
1. AUG '15 [1] Ans: 2
2. JAN '16 [20] Ans: 1
3. JAN '18 [19] Ans: 2
4. AUG '18 [8] Ans: 3
5. JAN '19 [10] Ans: 3
6. JUN '19 [4] Ans: 2
7. AUG '19 [5] Ans: 1
8. JAN '20 [7] Ans: 4
9. JUN '21 [13] Ans: 3
10. JUN '14 [28]
    $(4, -1)$, function is shifted 2 to the right
11. AUG '14 [33]



    shifted 2 units down; shifted 4 units to the right
12. JUN '15 [25]



    shifted 3 units to the right
13. JUN '16 [32]
    $g(x) = x^3 + 2x^2 - 4$ because $g(x)$ is a translation 4 units down.
14. AUG '16 [26]
    Translated 2 units right and 3 units down
15. JUN '17 [32]
    $g(x)$ is a translation a units right and $h(x)$ is a translation a units down.
16. JUN '18 [28]



17. JUN '22 [26]
    Translated 3 units right and 4 units down
18. AUG '22 [30]
    Translated 2 units left

16.2 Reflections

There are no Regents exam questions on this topic.

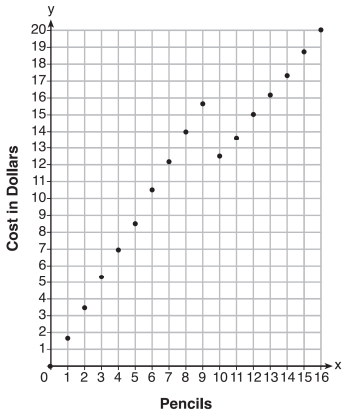
16.3 Stretches

1. AUG '14 [17] Ans: 1
2. JAN '15 [12] Ans: 2
3. JAN ’17 [17] Ans: 2
4. AUG ’22 [11] Ans: 4
5. JAN ’23 [10] Ans: 1

Chapter 17. Discontinuous Functions

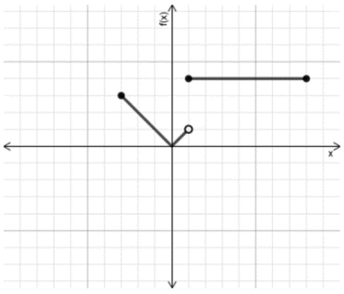
17.1 Piecewise Functions

1. AUG '14 [22] Ans: 2
2. AUG '15 [16] Ans: 2
3. AUG '18 [15] Ans: 4
4. JUN '22 [10] Ans: 3
5. SEP '13 [12]



Since according to the graph, 8 pencils cost \$14 and 10 pencils cost \$12.50, the cashier is correct.

6. JAN '15 [30]



7. JUN '15 [34]

$15(52 - 40) + 400 = 580$

$10(38) = 380$

$580 - 380 = \$200$

$15(x - 40) + 400 = 445$

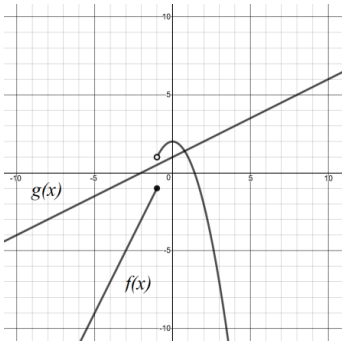
$15x - 600 + 400 = 445$

$15x = 645$

$x = 43$

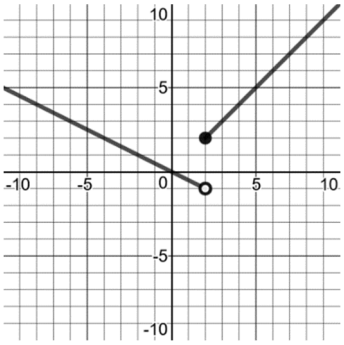
Solve $15(x - 40) + 400 = 445$ for x

8. JUN '16 [36]

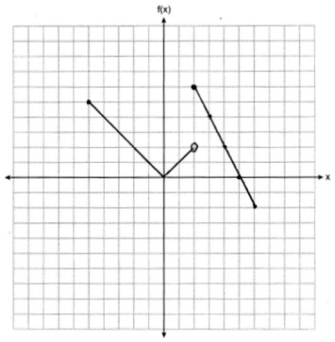


1, because there is one point of intersection

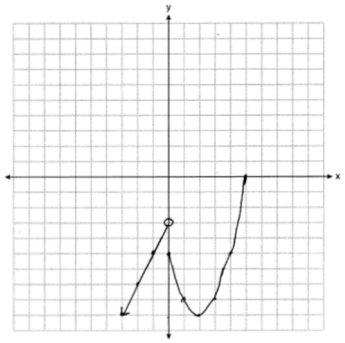
9. JUN '18 [32]



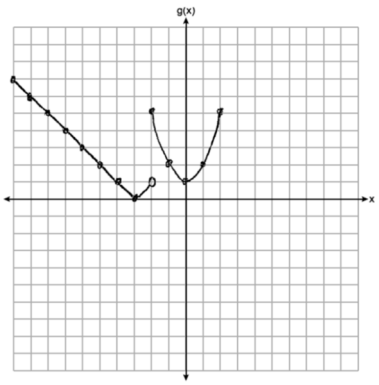
10. JUN '19 [27]



11. AUG ’19 [32]



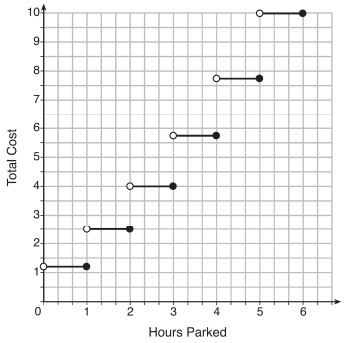
12. JAN ’23 [32]



17.2 Step Functions

1. JUN '15 [7] Ans: 1

2. SEP '13 [11]



The cost for each additional hour increases after the first 2 hours.

Chapter 18. Univariate Data

18.1 Types of Data

There are no Regents exam questions on this topic.

18.2 Frequency Tables

There are no Regents exam questions on this topic.

18.3 Histograms

There are no Regents exam questions on this topic.

18.4 Central Tendency

1. AUG '14 [4] Ans: 3
2. JUN '15 [20] Ans: 3
3. JAN '18 [16] Ans: 1

18.5 Distribution

1. JAN '17 [20] Ans: 4

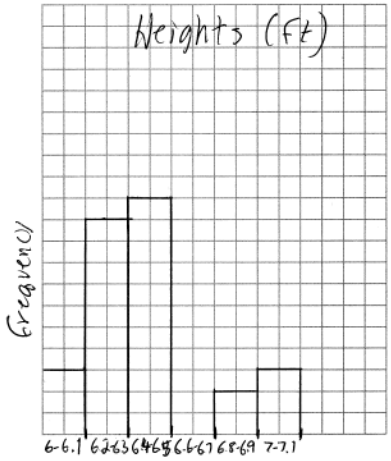
18.6 Standard Deviation

1. AUG '15 [19] Ans: 1
2. JUN '19 [22] Ans: 1
3. JAN '19 [31]
   Los Angeles because the standard deviation for LA (≈3.64) is less than the standard deviation for Miami (≈7.23)

18.7 Percentiles and Quartiles

1. JUN '14 [19] Ans: 3
2. JUN '16 [20] Ans: 3
3. JUN '17 [15] Ans: 4
4. JUN '22 [14] Ans: 3
5. AUG '17 [34]

Interval	Frequency
6.0 – 6.1	3
6.2 – 6.3	10
6.4 – 6.5	11
6.6 – 6.7	0
6.8 – 6.9	2
7.0 – 7.1	3



For 29 players, the upper quartile would be taller than 21 heights ($29 \times 0.75 = 21.75$). The 22nd value is in the 6.4 – 6.5 interval.

6. AUG '18 [31]
   4th Period because the IQR and σ_x are greater for 4th Period.
7. AUG '22 [28]
   $Q_3 = 61.5$ and $Q_1 = 51$, so the IQR is $61.5 - 51 = 10.5$.

18.8 Box Plots

1. JAN '15 [14] Ans: 4
2. AUG '16 [3] Ans: 4
3. JUN '18 [5] Ans: 2
4. AUG '19 [15] Ans: 1
5. JAN '20 [22] Ans: 4
6. JUN '21 [19] Ans: 3
7. AUG '22 [10] Ans: 1
8. JAN '23 [6] Ans: 3
9. JUN '14 [32]

Chapter 19. Bivariate Data

19.1 Two-Way Frequency Tables

1. JUN '16 [15] Ans: 4
2. JAN '17 [5] Ans: 2
3. JUN '18 [9] Ans: 1
4. AUG '18 [14] Ans: 2
5. JUN '19 [12] Ans: 2
6. AUG '19 [6] Ans: 2
7. JAN '20 [10] Ans: 3
8. AUG '22 [12] Ans: 2
9. JAN '15 [26]
   $\frac{33+12}{180} = 25\%$
10. JAN '16 [30]
    $\frac{70}{105} = \frac{2}{3}$; $\frac{2}{3} \times 351 = 234$
    234 males
11. JUN '17 [29]

	Watch Sports	Don't Watch Sports	Total
Like Pop	26	28	54
Don't Like Pop	34	12	46
Total	60	40	100

12. JAN '23 [26]
    $\frac{46}{39+46+37} \approx 38\%$

19.2 Scatter Plots

There are no Regents exam questions on this topic.

19.3 Correlation and Causality

1. JAN '17 [13] Ans: 2
2. AUG '17 [8] Ans: 2
3. AUG '18 [21] Ans: 3
4. JUN '22 [1] Ans: 2

19.4 Identify Correlation in Scatter Plots

1. JUN '16 [4] Ans: 2

19.5 Lines of Fit

1. AUG '14 [21] Ans: 4
2. JAN '19 [1] Ans: 2
3. SEP '13 [7]
   $y = 0.05x - 0.92$
4. AUG '16 [33]
   $y = 17.159x - 2.476$
   $y = 17.159(0.65) - 2.476 \approx 8.7$
5. JAN '18 [34]
   $y = -8.5x + 99.2$; the y-intercept represents the original length of the rope; the slope represents how much shorter the rope gets (8.5 cm) after each knot.

19.6 Correlation Coefficients

1. JUN '14 [11] Ans: 3
2. JUN '15 [16] Ans: 2
3. AUG '16 [6] Ans: 2
4. JAN '17 [3] Ans: 4
5. JUN '17 [14] Ans: 1
6. AUG '17 [22] Ans: 1
7. AUG '22 [23] Ans: 1
8. JAN '15 [35]
   0.94; it shows a strong positive relationship between the calories and mg of sodium
9. AUG '15 [36]
   $y = 0.16x + 8.27$; 0.97, a strong association
10. JAN '16 [35]
    $f(t) = -58t + 6182$; –0.94; yes, because it is close to –1
11. JAN '18 [31]
    $y = 0.81x + 15.19$; 0.92; there is a high positive correlation between mathematics and physics scores.
12. JUN '18 [36]
    $y = 0.96x + 23.95$; 0.92; there is a high positive correlation between scoring 85 or better on the math and English exams.
13. JAN '19 [34]
    $y = 1.9x + 29.8$; $r = 0.3$, which represents a weak correlation between a dog's mass and height.
14. JUN '19 [35]
    $y = 7.79x + 34.27$; $r = 0.98$, which represents a high positive correlation between hours spent studying and test scores.
15. AUG '19 [35]
    $y = -7.76x + 246.34$; $r = -0.88$. There is a negative correlation; as the distance from Times Square increases, the cost of a room decreases.
16. JAN '20 [35]
    $f(p) = -0.79p + 249.86$; $r = -0.95$. There is a strong negative correlation; as the sales price increases, the number of new homes available decreases.
17. JUN '21 [33]
    $y = 1.72x + 69.4$; $r = 0.97$. There is a strong positive correlation; as the number of jumping jacks increases, the heart rate increases.
18. JUN '22 [35]
    $y = -0.96x + 64.74$; $r = -0.98$. There is a strong negative correlation; as the driver's age increases, the percentage of accidents caused by speeding decreases.
19. JAN '23 [34]
    $y = -2.81x + 97.55$; $r = -0.97$. There is a strong negative correlation.