Ch 1

1. a) Domain = {0, 1, 2, 3, 4}, Range = {0, 2}
Function; each *x* value maps to only one *y* value
b) Domain = $\{x \in R \mid -9 \leq x \leq 1\}$, Range = $\{f(x) \in R \mid 0 \leq f(x) \leq -10\}$
Not a function; fails the vertical-line test
c) Domain = $\{x \in R\}$, Range = $\{f(x) \in R \mid f(x) \geq -3\}$

$\left(-6 \leq x \leq 6\right)$

d) Domain = $\{x \in R\}$, Range = $\{f(x) \in R\}$

$\left(-3 \leq y \leq 5\right)$

2. a) $f(-5) = -19$
b) $f(0) = 6$
c) $g\left(\dfrac{3}{4}\right) = 0$
d) $g(3a) = 12a - 3$
e) $f(-b - 4) = -5b - 14$
f) $f(3) - f(-3) = 30$.
3. a) Domain = $\{x \in R \mid x \geq 5\}$, Range = $\{f(x) \in R \mid f(x) \geq 0\}$
b) Domain = $\{x \in R\}$, Range = $\{f(x) \in R \mid f(x) \leq -4\}$

4. a) $f^{-1}(x) = \dfrac{-(x - 5)}{7}$
b) $f^{-1}(x) = \dfrac{-(x - 1)}{9}$
5. a) $f^{-1}(x) = 0$
b) $f^{-1}(x) = 4 - 5x$
6. a) $f(x) = -2(x - 3)^2 + 3$
b) $f(x) = |x + 1| - 3$
7. a) $f(x) = (-3(x + 1))^2 + 5$ $-\dfrac{1}{3}$
b) $f(x) = -2|x - 2| - 1$
c) $f(x) = \dfrac{1}{3(x + 3)} + 2$
d) $f(x) = -3\sqrt{x + 4} - 3$

Day 1

Day 2

Chapter 3 Chapter Review Extra Practice Answers

1. a) $f(x) = 8x^2 + 32x + 27$; y-intercept: $(0, 27)$
b) $f(x) = -3x^2 + 15x + 108$; y-intercept: $(0, 108)$
c) $f(x) = -7x^2 + 14x - 1$; y-intercept: $(0, -1)$
d) $f(x) = \frac{1}{5}x^2 + \frac{3}{5}x - 2$; y-intercept: $(0, -2)$
e) $f(x) = 0.25x^2 + 4x + 12$; y-intercept: $(0, 12)$
f) $f(x) = -12x^2 + 84x - 144$; y-intercept: $(0, -144)$

2. a) minimum; $(2, -3)$
b) maximum; $\left(-\frac{1}{2}, -\frac{5}{2}\right)$
c) minimum; $(-6, -5)$
d) minimum; $(6, 1.5)$
e) maximum; $(-9, -2)$
f) maximum; $(8, -8)$

3. a) $y = 3 \pm \sqrt{\dfrac{x-1}{15}}$
b) $y = -2 \pm \sqrt{\dfrac{x + 22.5}{7.5}}$
c) $y = 9 \pm \sqrt{-\dfrac{x + 27}{18}}$
d) $y = -50 \pm \sqrt{10x + 3}$
e) $y = -17 \pm \sqrt{\dfrac{x-2}{9}}$
f) $y = \pm \sqrt{-x - 100}$

4. a) $3\sqrt{7}$
b) $12\sqrt{5}$
c) $10\sqrt{3}$
d) $-\frac{1}{10}\sqrt{17}$
e) $30\sqrt{3}$
f) $1.4\sqrt{19}$

5. a) $x = -\frac{1}{2}$ or $x = \frac{4}{3}$
b) $x = -\frac{1}{6}$ or $x = \frac{9}{2}$
c) $x = -1$ or $x = -\frac{5}{4}$
d) $x = \frac{2}{3}$ or $x = \frac{3}{2}$
e) $x = -\frac{5}{2}$ or $x = -\frac{1}{4}$
f) $x = 9$ or $x = -\frac{3}{2}$

6. a) 0
b) 2
c) 2
d) 2
e) 1
f) 0

7. a) $f(x) = -\frac{1}{9}(x^2 - 7x - 8)$
b) $f(x) = \frac{1}{121}(x^2 - 24x + 144)$
c) $f(x) = \frac{1}{4}(x^2 - 9)$
d) $f(x) = -7x^2 + 28x - 19$
e) $f(x) = \frac{2}{21}(x^2 - 11x + 30)$
f) $f(x) = \frac{1}{20}x^2 + \frac{3}{10}x + \frac{29}{20}$

8. a) 2
b) 2
c) 0
d) 2
e) 1

Day 1

b) $\dfrac{28m^2 - 3mn}{6n^2}$ or $\dfrac{m(28m - 3n)}{6n^2}$; $m, n \neq 0$

c) $\dfrac{x^2 + 1}{y^2}$, $x, y \neq 0$

d) $\dfrac{5(x-4)^2}{y}$, $x \neq 0$, $y \neq -2, 0$

7. False.

8. B, C, D, F

Ch 2 *(handwritten, red)*

Chapter Review

1. a) $-5m - 4n + 17$
b) $-a + 10b - 15$
c) $5x^2 - 2x - 5$
d) $2m^2 + 6mn + 8n^2$

2. a) yes
b) no

3. a) $y^2 - 7y + 12$
b) $21x^2 - 11x - 2$
c) $15z^2 + 5z - 10$
d) $4x^3 - 12x^2y + 12xy^2 - 4y^3$
e) $6t^3 + 7t^2 - 14t - 15$

4. a) $(y - 2)(y + 6)$
b) $3x(2x^2 + x - 3)$
c) $(3z + 2)(z - 4)$
d) $5mn^2(m^3 - 4m + 2n)$
e) $(8 + k)(8 - k)$
f) $(2x + 3)(x - 1)$

5. a) $(x^2 + 1)(x - 5)$
b) $(y^2 + 3)(4y - 3)$
c) $4(a - 5)(a + 5)$
d) $(8z + 2)(4z - 9)$ $\longrightarrow$ *(handwritten)* $2(4z+1)(4z-9)$

6. a) $\dfrac{x+2}{2}$ *(handwritten)* $x \neq 2$
b) $4n^2 + 2$ or $2(2n^2 + 1)$
c) $\dfrac{3z - 1}{z + 4}$, $z \neq -4, \dfrac{1}{2}$
d) $\dfrac{3k + 2}{k + 6}$, $k \neq -6, 6$

7. a) 6; $x, y \neq 0$
b) $15m^2n$; $m, n \neq 0$
c) $\dfrac{40z}{3y}$; $x, y, z \neq 0$
d) $\dfrac{3x(x - 4)}{x - 1}$; $x \neq 0, 1, -3$

Day 2 *(handwritten, blue)*

Ch 2

Day 2

7. e) $\dfrac{2(y+3)}{y-1}$, $y \neq -\dfrac{5}{2}, 1, -1, -3$

8. a) $\dfrac{3y}{4}$

b) $\dfrac{9z+13}{(z+1)(z+3)}$, $z \neq -1, -3$

c) $\dfrac{-2k-3}{(k-4)(k+2)(k+3)}$, $k \neq 4, -2, -3$

d) $\dfrac{25x^2 - 14x}{14y^2}$ or $\dfrac{x(25x-14)}{14y^2}$, $x, y \neq 0$

Chapter 4 Chapter Review Extra Practice Answers

1. a) $(-5)^2 = 25$

b) $8^{-2} = \dfrac{1}{64}$

c) $2^{-12} = \dfrac{1}{4096}$

d) $(-4)^5 = -1024$

e) $(-6)^{-1} = -\dfrac{1}{6}$

f) $10^{-1} = \dfrac{1}{10}$

Day 3

2.

Exponential Form	Radical Form	Evaluation
$\left(\dfrac{4}{25}\right)^{\frac{1}{2}}$	$\sqrt{\dfrac{4}{25}}$	$\dfrac{2}{5}$
$81^{\frac{1}{4}}$	$\sqrt[4]{81}$	3
$625^{1.25}$	$(\sqrt[4]{625})^5$	3125
$(-32)^{\frac{7}{5}}$	$(\sqrt[5]{-32})^7$	-128
$(9^7)^{\frac{1}{7}}$	$\sqrt[7]{9^2}$	9
$243^{\frac{6}{5}}$	$(\sqrt[5]{243})^6$	729

3. a) $\dfrac{1}{a^3}$

b) $\dfrac{1}{n^{945}}$

c) d^4

d) $\dfrac{1}{x^3}$

4. a) 65 536

b) -9

c) -2

5. a) quadratic

b) exponential

6. a) $y = \left(\dfrac{3}{2}\right)^x$; horizontal compression by factor $\dfrac{1}{2}$, vertical translation of 2 units down; $y = -2$

b) $y = 1.5^x$; vertical stretch of factor 5, horizontal stretch of factor 3, vertical translation of 4 units up; $y = 4$

c) $y = 1.05^x$; horizontal compression of factor $\dfrac{1}{3}$, horizontal translation of 1 unit to the right; $y = 0$

d) $y = 1.2^x$; vertical compression of factor $\dfrac{1}{2}$, horizontal compression of factor $\dfrac{1}{4}$, horizontal translation of $\dfrac{1}{2}$ unit to the left

7. a) $P = 38\ 000(1.035)^n$

b) P represents the city's population, 38 000 represents the population in 2004, 1.035 represents the 3.5% growth, and n represents the number of years
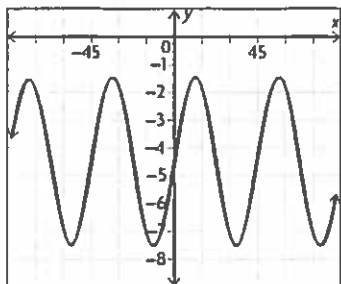
c) About 55 479

d) About 40 012

e) 2020

Chapter 6 Review Extra Practice Answers

1. Answers may vary. One example is the following:

2. a) (0.08, 0.24)
   b) (15.84, 2.23)
   c) (3.09, 5.14)
   d) (0.08, 0.49)

3. a) The function $y = \cos x$ has been moved to the right by 71°.
   b) The function $y = \sin x$ has been horizontally stretched by a factor of 25.
   c) The function $y = \cos x$ has been vertically stretched by a factor of 19.
   d) The function $y = \sin x$ has been moved down $\frac{1}{11}$ units.
   e) The function $y = \cos x$ has been reflected in the x-axis.
   f) The function $y = \sin x$ has been horizontally compressed by a factor of $\frac{1}{50}$.

4. a) period: 40°; amplitude: 17; equation of the axis: $h = 13$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 200\}$; R $= \{h \in \mathbf{R} \mid -4 \le h \le 30\}$
   b) period: 180°; amplitude: $\frac{1}{10}$; equation of the axis: $j = -4$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 900\}$; R $= \{j \in \mathbf{R} \mid -4\frac{1}{10} \le j \le -3\frac{9}{10}\}$
   c) period: 1440°; amplitude: 33; equation of the axis: $h = -61$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 7200\}$; R $= \{h \in \mathbf{R} \mid -94 \le h \le -28\}$
   d) period: 30°; amplitude: 1; equation of the axis: $j = 32$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 150\}$; R $= \{j \in \mathbf{R} \mid 31 \le j \le 33\}$
   e) period: 2160°; amplitude: 2; equation of the axis: $h = -70$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 10800\}$; R $= \{h \in \mathbf{R} \mid -72 \le h \le -68\}$

   f) period: 120°; amplitude: 8.5; equation of the axis: $j = 3.5$; D $= \{x \in \mathbf{R} \mid 0 \le x \le 600\}$; R $= \{j \in \mathbf{R} \mid -5 \le j \le 12\}$

5. a) $f(x) = 15.5 \cos(4x) + 3.5$ or
      $f(x) = 15.5 \sin(4x + 90°) + 3.5$
   b) $f(x) = -7 \cos(18x) + 3.5$ or
      $f(x) = -7 \sin(18x + 90°) + 3.5$
   c) $f(x) = 11 \cos(360x) + 215$ or
      $f(x) = 11 \sin(360x + 90°) + 215$
   d) $f(x) = -\dfrac{1}{50}\cos\left(\dfrac{1}{10}x\right) + \dfrac{3}{50}$ or
      $f(x) = -\dfrac{1}{50}\sin\left(\dfrac{1}{10}x + 90°\right) + \dfrac{3}{50}$

6. a) $d = 47.5$ m
   b) 7.5 m; the radius of the human centrifuge
   c) 1 s; the amount of time it takes the human centrifuge to make one complete revolution — 4 s
   d) R $= \{d \in \mathbf{R} \mid 40 \le d \le 55\}$
   e) $d(t) = 7.5 \sin(360t) + 47.5$ — 90
   f) 47.5 m; 40.37 m

Functions 11: Chapter 6 Review Extra Practice Answers

Chapters 1–3 Cumulative Review Extra Practice Answers

1. $y \neq 0, -3, 4$

2. 25.3 m

3. c

4. $\dfrac{x^3 - 5x^2 + x - 15}{(x - 7)(x + 3)}$

5. $k = \dfrac{9}{4}$

6. d

7. about 1.0s

8. a

9. -71, zero roots

10. b

11. 194

12. a

13. c

Chapter 5 Review Extra Practice Answers

1. a) $x = 4$

  b) $\csc \theta = \dfrac{5}{3}$, $\sec \theta = \dfrac{5}{4}$, $\cot \theta = \dfrac{4}{3}$

  c) $\theta = 37°$

2. For each triangle:
  i) Calculate the exact value of x.
  ii) Calculate the exact area.

  a) i) $x = 3\sqrt{2}$
    ii) 9 units^2
  b) i) $x = \dfrac{11}{2}\sqrt{3}$
    ii) $\dfrac{121}{8}\sqrt{3}$

3. a) $\theta = 120°, 240°$
  b) $\theta = 45°, 225°$
  c) $\theta = 30°, 150°$

4. Given the following coordinates:
  i) Determine the value of r to the nearest tenth.
  ii) State the primary trigonometric ratios for angle θ.
  iii) State the value θ to the nearest degree if
    $0° \leq \theta \leq 360°$.

  a) i) $r = 3.6$

    ii) $\sin \theta = \dfrac{3}{3.6}$, $\cos \theta = \dfrac{2}{3.6}$, $\tan \theta = \dfrac{3}{2}$

    iii) $\theta = 56°$

  b) i) $r = 10.3$

    ii) $\sin \theta = \dfrac{5}{10.3}$, $\cos \theta = -\dfrac{9}{10.3}$,

      $\tan \theta = -\dfrac{5}{9}$

    iii) $\theta = 151°$

  c) i) $r = 5.7$

    ii) $\sin \theta = -\dfrac{4}{5.7}$, $\cos \theta = -\dfrac{4}{5.7}$, $\tan \theta = 1$

    iii) $\theta = 225°$

  d) i) $r = 8.5$

    ii) $\sin \theta = -\dfrac{3}{8.5}$, $\cos \theta = \dfrac{8}{8.5}$, $\tan \theta = -\dfrac{3}{8}$

    iii) $\theta = 339°$

5. a) $\sin \theta$
  b) $\sec \theta$

6. a) $(\tan \theta + 6)(\tan \theta - 6)$
  b) $(\sin \theta - 4)^2$

7. $BC = 7.43$ m, $AD = 8.31$ m

8. $h = 25.2$ m

9. $d = 52$ m, $h = 106$ m