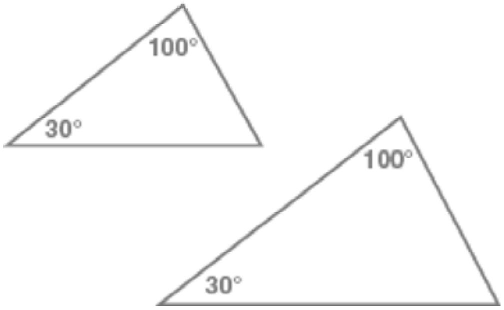
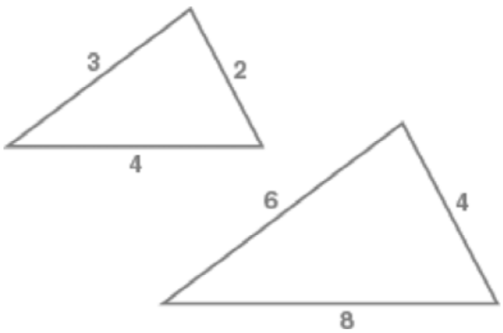
2017-2018 Integrated 2 Midterm Review - Baker
Answer Section

1.



One angle in each triangle measures 100°, and one angle in each triangle measures 30°. The triangles are similar because two angles of one triangle are congruent to two angles of the other triangle.

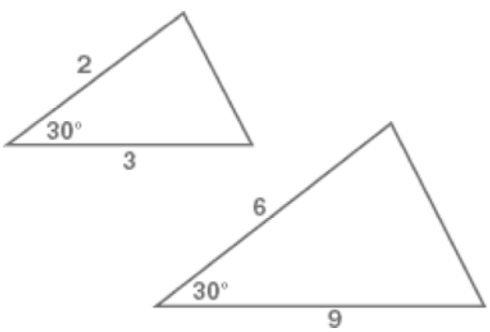
2.



The ratios of the corresponding side lengths are equal: $\frac{2}{4} = \frac{3}{6} = \frac{4}{8}$.

The triangles are similar because the corresponding sides are proportional.

3.



The ratios of two pairs of corresponding side lengths are equal: $\frac{2}{6} = \frac{3}{9}$.

Also, the corresponding angles between those sides each have a measure of 30°. The triangles are similar because two of the corresponding sides of the two triangles are proportional and the included angles are congruent.

4. The length of segment *HF* is 17.5 centimeters.

$$\frac{GH}{HF} = \frac{GJ}{JF}$$

$$\frac{21}{HF} = \frac{18}{15}$$

$$18 \cdot HF = 315$$

$$HF = 17.5$$

5. $$\frac{4x-3}{3x-1} = \frac{8x-7}{5x-3}$$

$$(3x-1)(8x-7) = (5x-3)(4x-3)$$

$$24x^2 - 29x + 7 = 20x^2 - 27x + 9$$

$$4x^2 - 2x - 2 = 0$$

$$(4x+2)(x-1) = 0$$

$$x = -\frac{1}{2}, 1$$

$x \neq -\frac{1}{2}$, because you get a negative distance when substituted back into the equation so $x = 1$.

6. $$\frac{x}{9} = \frac{2}{6}$$

$$6x = 18$$

$$x = 3$$

7. The triangles are congruent by the Angle-Angle Similarity Theorem. Two corresponding angles are congruent.

8. The triangles are congruent by the Side-Side-Side Similarity Theorem. All corresponding sides are proportional.

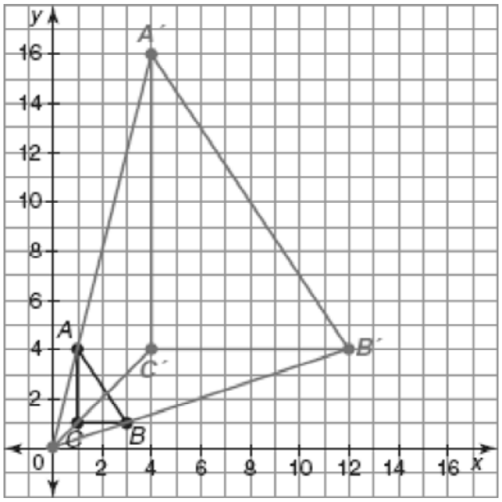
$$\frac{4}{8} = \frac{1}{2}$$

$$\frac{4}{8} = \frac{1}{2}$$

$$\frac{5}{10} = \frac{1}{2}$$

9. $$\frac{AD}{GL} = \frac{DF}{LM} = \frac{AF}{GM}$$

10.



11. $D(8,4) \rightarrow D'(5(8), 5(4)) = D'(40,20)$

$E(2,6) \rightarrow E'(5(2), 5(6)) = E'(10,30)$

$F(3,1) \rightarrow F'(5(3), 5(1)) = F'(15,5)$

12. The known corresponding sides of the triangles are proportional: $\frac{6}{3} = \frac{2}{1}$ and $\frac{8}{4} = \frac{2}{1}$.

The angle between the known sides is a right angle for both triangles, so those angles are congruent. Therefore, by the Side-Angle-Side Similarity Postulate, the triangles are similar.

13. The palm tree is 24 feet tall.

$$\frac{x}{6} = \frac{45}{11.25}$$

$$x = 24$$

14. The absolute maximum of the function is at about (1.31, 32.56).
The x-coordinate of 1.31 represents the time in seconds after the baseball is thrown that produces the maximum height.
The y-coordinate of 32.56 represents the maximum height in feet of the baseball.

15. Interval of increase: $(2, \infty)$

Interval of decrease: $(-\infty, 2)$

16. The x-intercepts are $(-4,0)$ and $(2,0)$.

17. $f(x) = a(x+8)(x+1)$ for $a > 0$

18. The axis of symmetry is $x = -1$.

The x-coordinate of the vertex is -1.

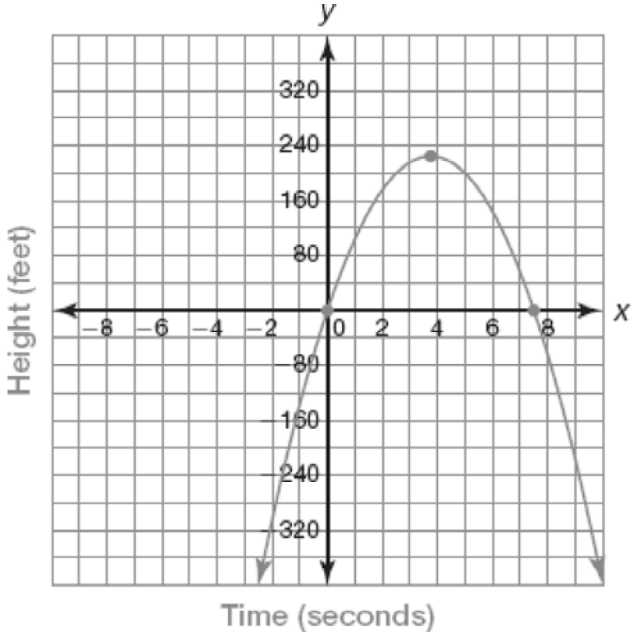
The y-coordinate when $x = -1$ is:

The vertex is $(-1,-16)$.

19. The vertex is $(1, -8)$.

20. The vertex is $(1, -8)$.
The function in vertex form is
$f(x) = 2(x-1)^2 - 8$.

21.



Absolute maximum: (3.75, 225)

Zeros: (0, 0), (7.5, 0)

Domain of graph: The domain is all real numbers from negative infinity to positive infinity.

Domain of the problem: The domain is all real numbers greater than or equal to 0 and less than or equal to 7.5.

Range of graph: The range is all real numbers less than or equal to 225.

Range of the problem: The range is all real numbers less than or equal to 225 and greater than or equal to 0.

22. The function is in vertex form.
The parabola opens up and the vertex is $(3, 12)$.

23. The function is in factored form.
The parabola opens down and the x-intercepts are $(8, 0)$ and $(4, 0)$.

24. The function is in standard form.
The parabola opens down and the y-intercept is $(0, 0)$.

25. The graph of $g(x)$ is translated up 5 units, right 2 units and reflected across the x axis.

26. $4m^2 + 9m - 2m^2 - 6$

$(4m^2 - 2m^2) + 9m - 6$

$2m^2 + 9m - 6$

27. $(2x+1)(x+3) = 2x^2 + 7x + 3$

28. $(x+2)(x^2+6x-1) = (x+2)(x^2)+(x+2)(6x)-(x+2)(1)$

$$= x(x^2)+2(x^2)+x(6x)+2(6x)-x(1)-2(1)$$
$$= x^3+2x^2+6x^2+12x-x-2$$
$$= x^3+8x^2+11x-2$$

29.

•	x	2
x	x^2	$2x$
-4	$-4x$	-8

$x^2-2x-8=(x-4)(x+2)$

30.

$x^2+5x+6=0$

$(x+3)(x+2)=0$

$x+3=0$ or $x+2=0$

$x=-3$ or $x=-2$

Check:

$(-3)^2+5(-3)+6=0$

$9-15+6=0$

$0=0$

$(-2)^2+5(-2)+6=0$

$4-10+6=0$

$0=0$

The roots are -3 and -2.

31.

$4x^2-9=0$

$(2x+3)(2x-3)=0$

$2x+3=0$ or $2x-3=0$

$x=-\dfrac{3}{2}$ or $x=\dfrac{3}{2}$

The roots are $-\dfrac{3}{2}$ and $\dfrac{3}{2}$.

Check:

$4\left(-\dfrac{3}{2}\right)^2-9\stackrel{?}{=}0$

$4\left(\dfrac{9}{4}\right)-9\stackrel{?}{=}0$

$9-9\stackrel{?}{=}0$

$0=0$

$4\left(\dfrac{3}{2}\right)^2-9\stackrel{?}{=}0$

$4\left(\dfrac{9}{4}\right)-9\stackrel{?}{=}0$

$9-9\stackrel{?}{=}0$

$0=0$

32. $\sqrt{12}=\sqrt{4\cdot 3}$

$$=\sqrt{4}\cdot\sqrt{3}$$
$$=\pm 2\sqrt{3}$$

33.

$$x^2 + 4x - 6 = 0$$
$$x^2 + 4x = 6$$
$$x^2 + 4x + 4 = 6 + 4$$
$$(x + 2)^2 = 10$$
$$\sqrt{(x+2)^2} = \pm\sqrt{10}$$
$$x + 2 = \pm\sqrt{10}$$
$$x = -2 \pm \sqrt{10}$$
$$x \approx 1.16 \quad \text{or} \quad x \approx -5.16$$

Check:

$$(1.16)^2 + 4(1.16) - 6 \stackrel{?}{=} 0 \qquad (-5.16)^2 - 4(-5.16) - 6 \stackrel{?}{=} 0$$
$$1.3456 + 4.64 - 6 \stackrel{?}{=} 0 \qquad 26.6256 - 20.64 - 6 \stackrel{?}{=} 0$$
$$-0.0144 \approx 0 \qquad -0.0144 \approx 0$$

The roots are approximately 1.16 and −5.16.

34. $a = 1,\ b = 3,\ c = -5$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{(-3) \pm \sqrt{(3)^2 - 4(1)(-5)}}{2(1)}$$
$$x = \frac{-3 \pm \sqrt{9 + 20}}{2}$$
$$x = \frac{-3 \pm \sqrt{29}}{2}$$
$$x = \frac{-3 + 5.385}{2} \quad \text{or} \quad x = \frac{-3 - 5.385}{2}$$
$$x \approx 1.193 \quad \text{or} \quad x \approx -4.193$$

35. $-3x^2 + 8x - 2 = -6$

$-3x^2 + 8x + 4 = 0$

$a = -3,\ b = 8,\ c = 4$

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

$$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(-3)(4)}}{2(-3)}$$

$$x = \frac{-8 \pm \sqrt{64 + 48}}{-6}$$

$$x = \frac{-8 \pm \sqrt{112}}{-6}$$

$$x = \frac{-8 \pm \sqrt{16 \cdot 7}}{-6}$$

$$x = \frac{-8 \pm 4\sqrt{7}}{-6}$$

$$x = \frac{4 \pm 2\sqrt{7}}{3}$$

$$x = \frac{4 + 2\sqrt{7}}{3} \quad \text{or} \quad x = \frac{4 - 2\sqrt{7}}{3}$$

36. $a = 9, b = 5, c = 1$

$b^2 - 4ac = (5)^2 - 4(9)(1)$

$= 25 - 36$

$= -11$

Because $b^2 - 4ac < 0$ the function has no zeros.

37.

$x^2 + 7x - 2 = -12$

$x^2 + 7x + 10 = 0$

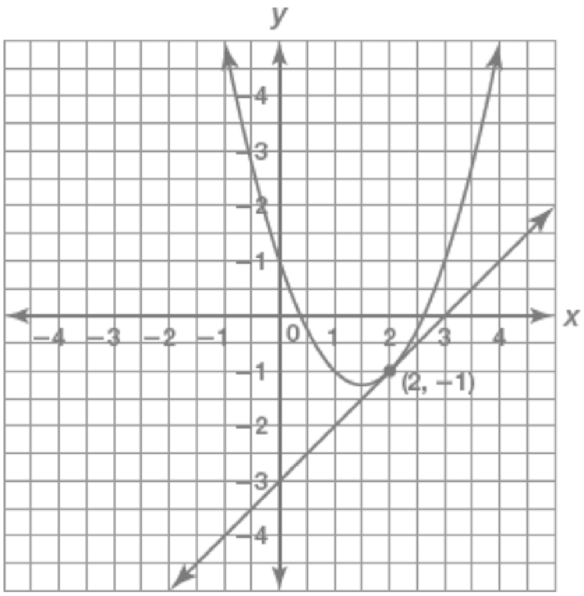
$x^2 + 7x + 10 = 0$

$(x + 2)(x + 5) = 0$

$x + 2 = 0$ or $x + 5 = 0$

$x = -2$ $\quad$ $x = -5$

38.



$x - 3 = x^2 - 3x + 1$

$0 = x^2 - 4x + 4$

$0 = (x - 2)(x - 2)$

$x - 2 = 0$

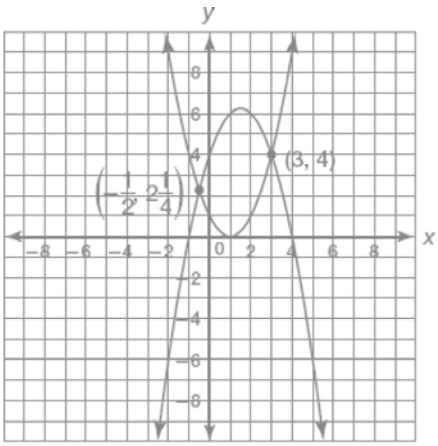
$x = 2$

$y = (2) - 3$

$y = -1$

The system has one solution: $(2, -1)$.

39.



$$-x^2 + 3x + 4 = x^2 - 2x + 1$$
$$0 = 2x^2 - 5x - 3$$
$$0 = (2x + 1)(x - 3)$$

$2x + 1 = 0$ or

$$2x = -1$$
$$x = -\frac{1}{2}$$
$$y = \left(-\frac{1}{2}\right)^2 - 2\left(-\frac{1}{2}\right) + 1$$
$$y = \frac{1}{4} + 1 + 1$$
$$y = \frac{9}{4} = 2\frac{1}{4}$$

$$x - 3 = 0$$
$$x = 3$$
$$y = (3)^2 - 2(3) + 1$$
$$y = 9 - 6 + 1$$
$$y = 4$$

The system has two solutions: $\left(-\frac{1}{2}, 2\frac{1}{4}\right)$ and $(3,4)$.

40. $5x - 8 + 7x + 10$

$(5x + 7x) + (-8 + 10)$

$12x + 2$

41. $\dfrac{10+\sqrt{-12}}{2} = \dfrac{10+\sqrt{12}\cdot\sqrt{-1}}{2}$

$= \dfrac{10+\sqrt{4}\cdot\sqrt{3}\cdot\sqrt{-1}}{2}$

$= \dfrac{10+2\sqrt{3}\,i}{2}$

$= \dfrac{10}{2}+\dfrac{2\sqrt{3}\,i}{2}$

$= 5+\sqrt{3}\,i$

42. $(4-5i)(8+i) = 32+4i-40i-5i^2$

$= 32+4i-40i-5(-1)$

$= (32+5)+(4i-40i)$

$= 37-36i$

43. $x = \dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-2\pm\sqrt{2^2-4(1)(5)}}{2(1)}$

$x = \dfrac{-2\pm\sqrt{4-20}}{2}$

$x = \dfrac{-2\pm\sqrt{-16}}{2}$

$x = \dfrac{-2\pm 4i}{2}$

$x = -1\pm 2i$

The zeros are $-1+2i$ and $-1-2i$.

44. $\sqrt{-20} = \sqrt{20}\cdot\sqrt{-1}$

$= \sqrt{4}\cdot\sqrt{5}\cdot\sqrt{-1}$

$= 2\sqrt{5}\,i$

45. $(2+5i)-(7-9i) = 2+5i-7+9i$

$= (2-7)+(5i+9i)$

$= -5+14i$

46. $9 + 3i(7 - 2i) = 9 + 21i - 6i^2$

$= 9 + 21i - 6(-1)$

$= (9 + 6) + 21i$

$= 15 + 21i$

47. $9 + 3i(7 - 2i) = 9 + 21i - 6i^2$

$= 9 + 21i - 6(-1)$

$= (9 + 6) + 21i$

$= 15 + 21i$

48. $y = 3(x + 2)^2 + 2$

49.