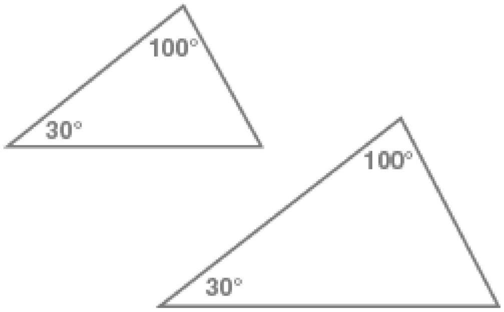
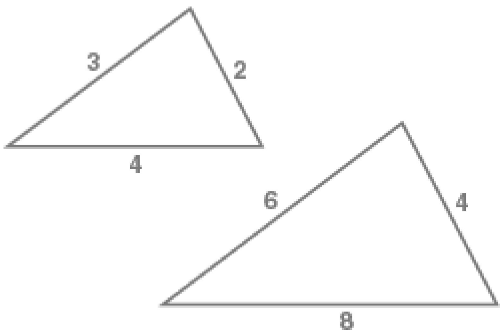
2018-2019 Integrated 2 Midterm Review
Answer Section

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.

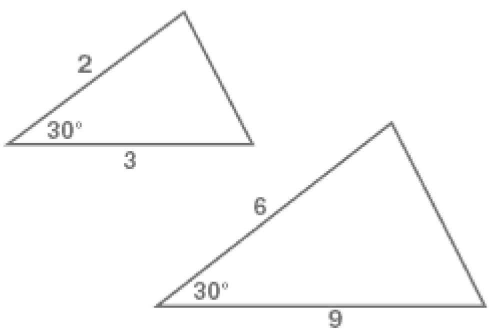
2.



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

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

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

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

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

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

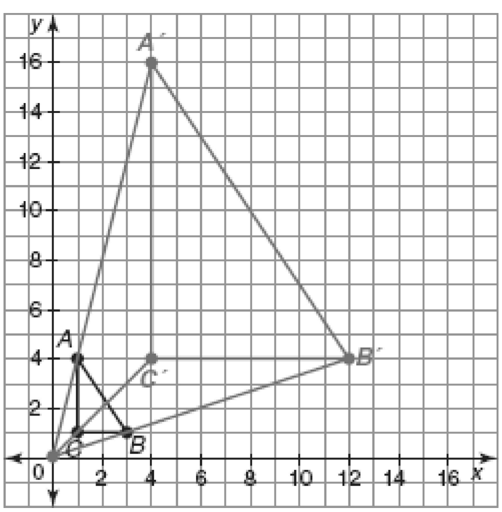
$x \neq -\frac{1}{2}$, because you get a negative distance when substituted back into the equation so $x = 1$.

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

$$6x = 18$$

$$x = 3$$

7.



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

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

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

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

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

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

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

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

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

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.

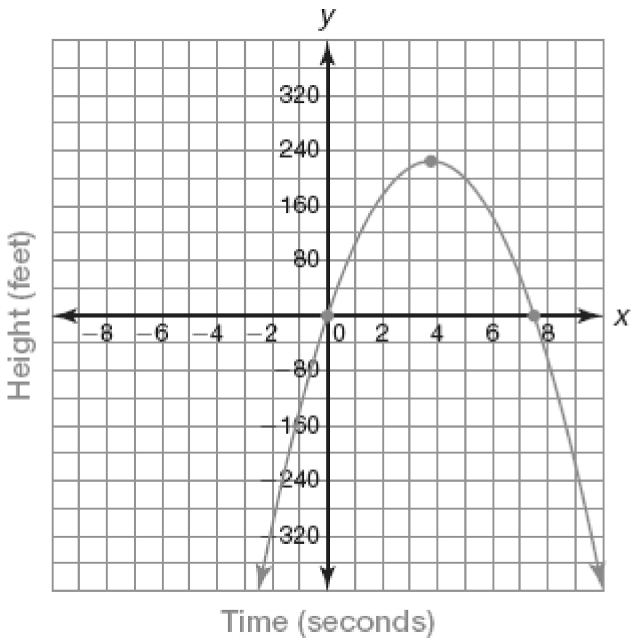
13. The palm tree is 24 feet tall.

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

$x = 24$

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.



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.

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

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

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

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

19. 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 $(-1,-16)$.

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

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

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

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

$2m^2 + 9m - 6$

26. $(2x+1)(x+3) = 2x^2 + 7x + 3$

27.
$$\begin{aligned}(x+2)(x^2+6x-1) &= (x+2)(x^2) + (x+2)(6x) - (x+2)(1)\\ &= x(x^2) + 2(x^2) + x(6x) + 2(6x) - x(1) - 2(1)\\ &= x^3 + 2x^2 + 6x^2 + 12x - x - 2\\ &= x^3 + 8x^2 + 11x - 2\end{aligned}$$

28.

•	x	2
x	x^2	$2x$
-4	$-4x$	-8

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

29.

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

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

$x + 3 = 0$ 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.

30.

$4x^2 - 9 = 0$

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

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

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

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

Check:

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

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

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

$0 = 0$

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

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

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

$0 = 0$

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

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

$= \pm 2\sqrt{3}$

32. $(x+20)^2 = 80$

$\sqrt{(x+20)^2} = \pm\sqrt{80}$

$x + 20 = \pm\sqrt{80}$

$x = -20 \pm \sqrt{80}$

$x = -20 \pm \sqrt{16 \cdot 5}$

$x = -20 \pm \sqrt{16} \cdot \sqrt{5}$

$x = -20 \pm 4\sqrt{5}$

The roots are $-20 + 4\sqrt{5}$ and $-20 - 4\sqrt{5}$.

33.

$x^2 + 4x - 6 = 0$

$x^2 + 4x = 6$

$x^2 + 4x + 4 = 6 + 4$

$(x+2)^2 = 10$

$\sqrt{(x+2)^2} = \pm\sqrt{10}$

$x + 2 = \pm\sqrt{10}$

$x = -2 \pm \sqrt{10}$

$x \approx 1.16$ or $x \approx -5.16$

Check:

$(1.16)^2 + 4(1.16) - 6 \stackrel{?}{=} 0$

$1.3456 + 4.64 - 6 \stackrel{?}{=} 0$

$-0.0144 \approx 0$

$(-5.16)^2 - 4(-5.16) - 6 \stackrel{?}{=} 0$

$26.6256 - 20.64 - 6 \stackrel{?}{=} 0$

$-0.0144 \approx 0$

The roots are approximately 1.16 and -5.16.

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

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

$$x = \frac{(-3) \pm \sqrt{(3)^2 - 4(1)(-5)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{9 + 20}}{2}$$

$$x = \frac{-3 \pm \sqrt{29}}{2}$$

$$x = \frac{-3 + 5.385}{2} \quad \text{or} \quad x = \frac{-3 - 5.385}{2}$$

$$x \approx 1.193 \qquad \text{or} \quad x \approx -4.193$$

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

$$\begin{aligned} b^2 - 4ac &= (5)^2 - 4(9)(1) \\ &= 25 - 36 \\ &= -11 \end{aligned}$$

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

37. $5x - 8 + 7x + 10$

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

$12x + 2$

38. $$\begin{aligned} \frac{10+\sqrt{-12}}{2} &= \frac{10+\sqrt{12}\cdot\sqrt{-1}}{2} \\ &= \frac{10+\sqrt{4}\cdot\sqrt{3}\cdot\sqrt{-1}}{2} \\ &= \frac{10+2\sqrt{3}\,i}{2} \\ &= \frac{10}{2}+\frac{2\sqrt{3}\,i}{2} \\ &= 5+\sqrt{3}\,i \end{aligned}$$

39. $$\begin{aligned} (4-5i)(8+i) &= 32+4i-40i-5i^2 \\ &= 32+4i-40i-5(-1) \\ &= (32+5)+(4i-40i) \\ &= 37-36i \end{aligned}$$

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

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

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

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

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

$x = -1 \pm 2i$

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

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

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

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

42. $(2+5i)-(7-9i) = 2+5i-7+9i$

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

$= -5+14i$

43. $9+3i(7-2i) = 9+21i-6i^2$

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

$= (9+6)+21i$

$= 15+21i$

44. $\frac{45}{4}$

45. $2m^4$

46. $(x+1)(2x-3)$

47. $-27 + 5i$

48. $4x^2 - 24x + 36$

49. $\frac{54}{37}$

50. a