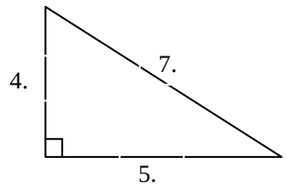
Math 2200 – Midyear Review

Name _____

1. What is the measure of the smallest acute angle in the triangle below?



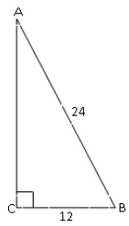
   a) $33°$ b) $40°$

   c) $50°$ d) $90°$

2. What three angles have a reference angle of 54^o?

   a) $99^o, 144^o, 234^o$ b) $108^o, 162^o, 216^o$
   c) $126^0, 234^o, 306^o$ d) $144^o, 234^o, 324^o$

3. Using the right triangle below, find the EXACT value of $\sin A$.



   a) $\frac{1}{\sqrt{3}}$ b) $\frac{2}{\sqrt{3}}$
   c) $\frac{1}{3}$ d) $\frac{1}{2}$

4. The terminal arm of an angle *A* in standard position passes through the point with coordinates $(40, -9)$. What are the **exact** values of the three primary trigonometric ratios for angle *A*?

   a) $sinA = -\frac{41}{9}, cosA = \frac{41}{40}, tanA = -\frac{9}{40}$ b) $sinA = \frac{40}{41}, cosA = -\frac{9}{41}, tanA = -\frac{40}{9}$
   c) $sinA = -\frac{40}{41}, cosA = \frac{9}{41}, tanA = -\frac{9}{40}$ d) $sinA = -\frac{9}{41}, cosA = \frac{40}{41}, tanA = -\frac{9}{40}$

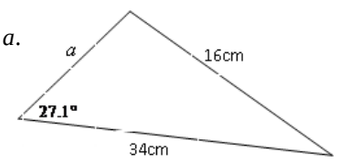
5. An angle θ is in standard position such that $\cos\theta = \frac{1}{9}$. What are the possible values of θ, to the nearest degree, if $0° \le \theta < 360°$?

   a) $6°$ and $174°$ b) $6°$ and $276°$ c) $84°$ and $264°$ d) $84°$ and $276°$

6. Find the value of *a*, to the nearest tenth, given the equation $\frac{a}{\sin 30^o} = \frac{12}{sin115^o}$.

   a) 6.6 b)21.8 c) 24.0 d)24.6

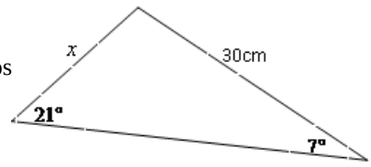
7. Determine, to the nearest tenth of a centimetre, the two possible values of *a*.



   a) 34.3cm and 26.3cm b) 55.8cm and 34.3cm

   c) 72.8cm and 26.3cm d) 72.8cm and 55.8cm

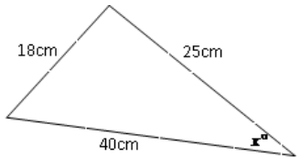
8. Which strategy would be best to find the value of *x* in the triangle below?



   a) the cosine law b) the primary trigonometric ratios

   c) the sine law d) Quadratic formula

9. Determine the measure of *x* to the nearest tenth of a degree.



   a) $18.1°$ b) $25.6°$

   c) $71.9°$ d) $136.3°$

10. In ΔABC below, $m < A = 152^o, b = 19, and\ a = 23.5$. What are the measures of the unknown angles and the lengths of the unknown sides of the triangle?

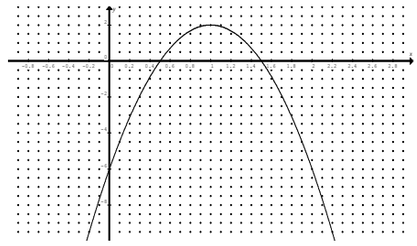
    a) $m < B = 22^0, m < C = 6^o, and\ c = 5.0$ b) $m < B = 158^0, m < C = 84^o, and\ c = 5.0$

    c) $m < B = 26, m < C = 174^o, and\ c = 28.7$ d) $m < B = 23, m < C = 7^o, and\ c = 28.2$

11. What is the equation of the axis of symmetry of $f(x) = -6(x-3)^2 - 7$?

    a) $x = -7$ b) $x = -6$ c) $x = -3$ d) $x = 3$

12. Which function corresponds to the parabola below?

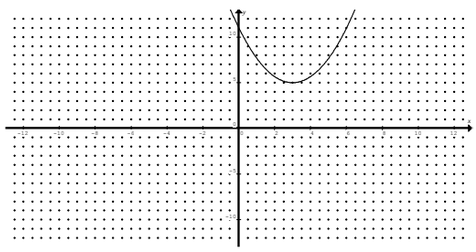


a) $f(x) = -8(x-2)^2 + 1$ b) $f(x) = -8(x-1)^2 + 2$

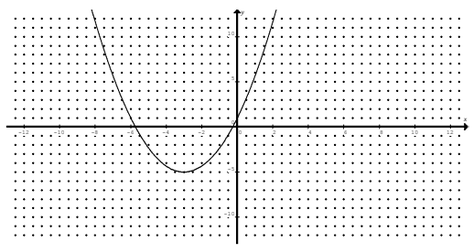
c) $f(x) = 8(x+1)^2 + 1$ d) $f(x) = 8(x-1)^2 - 2$

13. Which parabola is the graph of $f(x) = \frac{2}{3}(x+3)^2 - 5$?

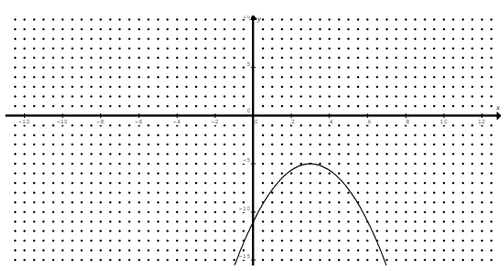
a)



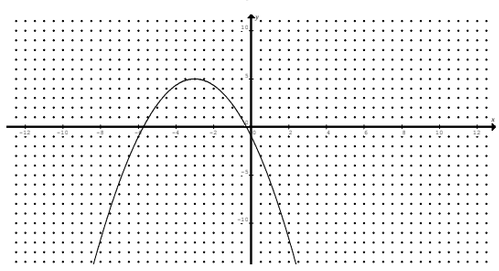
b)



c)



d)



14. What are the domain and range of $f(x) = 7(x-6)^2 + 9$?

a) $Domain: \{x | x \in R\}; Range\ \{f(x) | f(x) \geq 9\}$ b) $Domain: \{x | x \in R\}; Range\ \{f(x) | f(x) \leq -6\}$

c) $Domain: \{x | x \leq -6\}; Range\ \{f(x) | f(x) \in R\}$ d) $Domain: \{x | x \geq 7\}; Range\ \{f(x) | f(x) \in R\}$

15. The vertex of a parabola is located at the point with coordinates $(-5,6)$. If the parabola has a *y*-intercept of 231, what quadratic function that corresponds to the parabola?

a) $f(x) = 9(x-5)^2 + 6$ b) $f(x) = 9(x+5)^2 + 6$

b) $f(x) = -9(x+5)^2 + 6$ d) $f(x) = 9(x-5)^2 - 6$

16. Which phrase best describes the parabola that corresponds to $(x) = \frac{2}{3}(x+2)^2 - 9$?

a) The vertex has coordinates $(-2,-9)$ and the graph opens upward.

b) The vertex has coordinates $(-9,-2)$ and the graph opens downward.

c) The vertex has coordinates $(-2,-9)$ and the graph opens downward.

d) The vertex has coordinates $(-9,-2)$ and the graph opens upward.

17. What are the coordinates of the vertex of the parabola with equation $f(x) = 4x^2 + 8x - 2$?

a) $(-6,-1)$ b) $(-1,-6)$ c) $(8,-2)$ d) $(8,-6)$

18. Which function below is equivalent to $f(x) = 2(x-4)^2 - 2$?

a) $f(x) = 2x^2 - 8x + 30$ b) $f(x) = 2x^2 - 8x + 34$

c) $f(x) = 2x^2 - 16x + 34$ d) $f(x) = 2x^2 - 16x + 30$

19. Which phrase best describes the parabola with equation $f(x) = \frac{1}{7}x^2 - \frac{1}{7}x - \frac{1}{49}$?

a) maximum at $\left(\frac{1}{2}, -\frac{11}{196}\right)$ b) maximum at $\left(-\frac{11}{196}, \frac{1}{2}\right)$

c) minimum at $\left(\frac{1}{2}, -\frac{11}{196}\right)$ d) minimum at $\left(-\frac{11}{196}, \frac{1}{2}\right)$

20. Identify the line in which **first** error occurs in the workings below.

$y = -2x^2 - 9x + 11$

$y = -2\left(x^2 - 4.5x\right) + 11$ Line 2

$y = -2\left(x^2 - 4.5x + 5.0625 - 5.0625\right) + 11$ Line 3

$y = -2\left(x^2 - 4.5x + 5.0625\right) + 10.125 + 11$ Line 4

$y = -2\left(x - 2.25\right)^2 + 21.125$ Line 5

a) Line 2

b) Line 3

c) Line 4

d) Line 5

21. The school cafeteria sells 120 bottles of juice at a cost of $2. If for every 20 cent decrease in cost there is an increase in sales of 25 bottles, which equation describes the revenue?

a) $R = (120 - 25x)(2 + 0.20x)$ b) $R = (120 - 20x)(2 + 25x)$

c) $R = (120 + 20x)(2 - 25x)$ d) $R = (120 + 25x)(2 - 0.20x)$

22. What are the zeros of the function $f(x) = 3x(x + 2) + 2(x + 2)$?

a) $-2, -\frac{3}{2}$ b) $-2, -\frac{2}{3}$ c) $2, \frac{2}{3}$ d) $2, \frac{3}{2}$

23. What values of b will make $x^2 + bx + 19$ a perfect square trinomial?

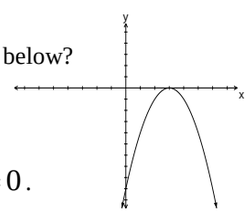
a) $\pm\frac{\sqrt{19}}{2}$ b) $\pm\sqrt{19}$ c) $\pm 2\sqrt{19}$ d) $\pm\frac{19}{2}$

24. Which function has $x = \frac{-k}{4p}$ as its axis of symmetry?

a) $y = \frac{1}{2}px^2 - kx + q$ b) $y = \frac{1}{2}px^2 + kx + q$

c) $y = 2px^2 - kx + q$ d)) $y = 2px^2 + kx + q$

25. What is the value of the discriminant for $f(x) = 0$ given the graph of $f(x)$ below?



c) -9 b) -3 c) 0 d) 3

26. Identify the line in which **first** error occurs in the "solution" to $3x^2 - 12x - 1 = 0$.

$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(3)(-1)}}{2(3)}$ LINE 1

$x = \frac{12 \pm \sqrt{144 - 12}}{6}$ LINE 2

$x = \frac{12 \pm \sqrt{136}}{6}$ LINE 3

$x = \frac{12 \pm 2\sqrt{34}}{6}$ LINE 4

a) LINE 1
b) LINE 2
c) LINE 3
d) LINE 4

27. Simplify $3\sqrt{175} + 6\sqrt{63}$

a) $9 + \sqrt{238}$ b) $33\sqrt{7}$ c) $9 + 2\sqrt{2}$ d) 114

28. Simplify $\sqrt[5]{160u^{10}t^{15}}$

a) $2u^2t^2(\sqrt[5]{5})$ b) $2u^3t^2(\sqrt[5]{5})$ c) $4u^2t^3(\sqrt[5]{5})$ d) $10u^2t^3(\sqrt[5]{4})$

29. Simplify $\frac{5}{6}(\sqrt[3]{1080}) + \frac{\sqrt[3]{135}}{8}$

a) $\frac{43}{8}\sqrt[3]{5}$ b) $\frac{23}{24}\sqrt[3]{6}$ c) $\frac{5}{48}\sqrt[3]{5}$ d) $\frac{5}{48} + 270\sqrt{2}$

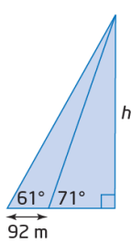
Answer all questions on this paper and show all workings for full credit. Note the choice in the last question.

30. If the terminal arm of an angle, θ, in standard position lies on the line $6y + x = 0, x \geq 0$, determine the value of θ to the nearest tenth of a degree.

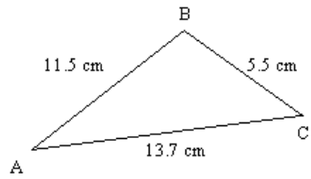
31. An angle θ, in standard position, has its terminal arm in Quadrant III and $\tan(\theta) = \frac{3}{4}$.

(a) Sketch the angle and the reference triangle, including the lengths of the sides of the reference triangle.
(b) Determine the exact value of $\sin(\theta)$ and $\cos(\theta)$, in lowest terms.
(c) What is the measure of the reference angle?
(d) What is the measure of θ?

32. Find the value of *h* in the diagram below. Give your answer to the nearest hundredth of a metre.



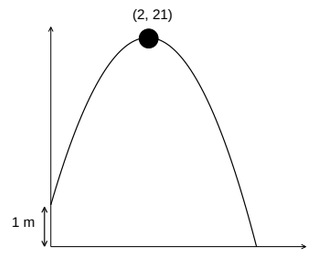
33. A drive belt wraps around three pulleys, A, B, and C, as shown. What is the measure of $\angle A$?



34. Express the quadratic function $y = -3x^2 + 12x - 10$ in vertex form.

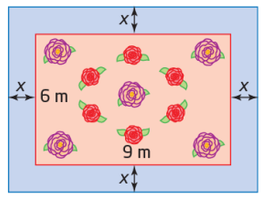
35. In ΔBHT, b = 10 cm, h = 13 cm, $\angle H = 76°$. Solve the triangle.

36. A ball is thrown from an initial height of 1 m and follows a parabolic path as shown. After 2 seconds the ball reaches a maximum height of 21 m. **Algebraically** determine the quadratic function that models the path followed by the ball, and use it to determine the approximate height of the ball at 3 seconds. Give your answer to the nearest tenth of a metre.



37. The cafeteria at Holy Spirit High sells energy bars for $2.25. At this price, the cafeteria will sell 120 bars per month. Mrs. Holloway determines that for every 5 cent decrease in price, eight more bars will be sold each month. **Algebraically** determine the price that will give the cafeteria maximum revenue.

38. The student council of Holy Spirit High plans to create a new rectangular flower garden in the grassy area behind the cafeteria. The flower bed will be 6m wide and 9m long and it will be surrounded by a concrete border of constant width with the same area as the flower bed. **Algebraically** determine the width, *w*, of the concrete border.



39. Factor $2(x+3)^2 - 11(x+3) + 15$ **OR** $9(x-2)^2 - \frac{1}{4}(x-4)^2$ **completely**.

40. Simplify each of the following and state restrictions.

a) $-9x^2y\sqrt{40x^5y^6}$

b) $\dfrac{-72\sqrt{y^9}}{6\sqrt{y^3}}$

c) $3\sqrt{xy} \bullet 5\sqrt{x^3}$

d) $\sqrt{3x}\left(\sqrt{4x^2 + 2\sqrt{x}}\right)$

e) $\left(3\sqrt{x} - 1\right)\left(2\sqrt{x} + 7\right)$

f) $\dfrac{\sqrt[3]{24x^3}}{\sqrt[3]{8x}}$

g) $\dfrac{6\sqrt{x^5}}{\sqrt{25x^2}}$

41. Simplify each of the following.

a) $4\sqrt{5} - 2\sqrt{75} + 3\sqrt{25}$

b) $\frac{1}{3}\sqrt[3]{72} - \frac{2}{3}\sqrt[3]{54} - \frac{1}{2}\sqrt[3]{108} - \frac{5}{6}\sqrt[3]{24}$

c) $2\sqrt{5}(3\sqrt{2} + 4\sqrt{3})$

d) $\dfrac{2\sqrt{3} - \sqrt{6}}{3\sqrt{6} + 2\sqrt{3}}$

42. Solve each of the following.

a) $\sqrt{x+5} = \sqrt{3x+1}$

b) $\sqrt{7x+25} - x = 1$