Name: _____ **Class:** _____ **Date:** _____ **ID: A**

MCF 3M Practice Exam

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. What is the amplitude of the function $3\sin(x - 4)$?
a. 3
b. 2
c. 1
d. 4

____ 2. What is the shortest interval in which a periodic function will complete one cycle?
a. a period
b. a wavelength
c. an event
d. an action

____ 3. What is the amplitude of the function $5\sin(4x + 30°) + 2$?
a. $4x$
b. 5
c. 2
d. 30°

____ 4. Simplify and express with positive exponents: $\dfrac{(c^{\frac{3}{4}})^{-\frac{1}{3}}c}{c^{\frac{1}{2}}}$.
a. $c^{\frac{7}{4}}$
b. $c^{\frac{5}{4}}$
c. $c^{\frac{3}{4}}$
d. $c^{\frac{1}{4}}$

____ 5. Use the discriminant to determine the number of roots of $x^2 - 3 = (3x - 2)(x + 7)$.
a. zero
b. one
c. two
d. three

____ 6. How often do peaks of a sinusoidal function occur?
a. once each period
b. twice each period
c. twice each cycle
d. once every 2 cycles

____ 7. What is the missing factor?
$-7y + y^2 - 18 = (?)(y + 2)$
a. $y + 9$
b. $y - 6$
c. $y - 7$
d. $y - 9$

____ 8. Write $27^{\frac{1}{3}}$ in radical form.
a. $\sqrt[3]{3}$
b. $\sqrt[\frac{1}{3}]{3}$
c. $\sqrt[3]{27}$
d. $\sqrt[\frac{1}{3}]{27}$

____ 9. A population of bacteria increases by 3.5% every day. What is the corresponding growth factor?
a. 1.035
b. 35
c. 0.35
d. 0.035

____ 10. The coordinates of the vertex of $y = (x - 4)(x + 2)$ are
a. (-4, 2)
b. (4, -2)
c. (1, -9)
d. (-9, 1)

____ 11. Shankir borrowed money at an interest rate of 5.75%/a compounded semi-annually that he will pay back in 5 years' time. He will repay $5576.32. How much money did he borrow?

a. $5150
c. $4450
b. $4200
d. $4800

____ 12. A donor gives $40 000 to the university she graduated from. The amount must be invested for 4 years, and the accumulated interest will be used to buy supplies for the biology laboratories. If the money earns 7.25%/a compounded monthly, how much will be available for the biology laboratories?

a. $40 975.46
c. $52 923.58
b. $53 410.47
d. $42 892.32

____ 13. A cup of coffee cools according to the equation $T(t) = 65\left(\frac{1}{2}\right)^{\frac{t}{22}} + 19$, where T is the temperature in °C after t minutes. Determine the temperature of the coffee after 30 minutes, to the nearest degree.

a. 25 °C
c. 44 °C
b. 19 °C
d. 33 °C

____ 14. An exponential function has

a. equal first differences
c. finite differences that only increase
b. equal second differences
d. differences that change multiplicatively

____ 15. State the type of transformation of sin x for the function $f(x) = 4\sin x$.

a. vertical stretch
c. horizontal stretch
b. vertical translation
d. horizontal translation

____ 16. What is the expression for 8^6 written as a base 2 power?

a. 2^{24}
c. 2^{18}
b. 2^{10}
d. 2^9

____ 17. Darlene neglected to pay a credit card bill of $630 at 18%/a., compounded daily, for 3 weeks after it was due. What is the amount she must pay to settle the bill at the end of the 3 weeks?

a. $753.67
c. $970.20
b. $750.34
d. $636.56

____ 18. Determine the roots of $x^2 - 22x + 121 = 0$ to the nearest hundredth.

a. 11
c. 2 and 11
b. –11
d. no real solution

____ 19. Calculate the total amount in an investment account if $2800 was invested at a simple interest rate of 5.5% for 18 months.

a. $3034.15
c. $7340.11
b. $3031.00
d. $5544.00

____ 20. Tolu deposits $930 in a savings account that pays compound interest annually. The table below shows his annual balance for this investment. What interest rate did the bank give Tolu?

Year	Final Balance ($)
1	964.88
2	1001.06
3	1038.60
4	1077.54

a. 3.75%
c. 4.25%
b. 4%
d. 4.5%

____ 21. The intensity of light *n* metres below the surface of water is given by $I(n) = I_0(0.98)^n$, where I_0 is the intensity of light at the surface of the water. Due to cloud cover, the surface at a region of the ocean has an intensity of 92%. What is the intensity of light 28 metres below the surface in that region? Round your answer to the nearest tenth.

a. 9.7%
c. 9.5%
b. 52.3%
d. 56.8%

____ 22. Determine which coordinate is the vertex of $f(x) = -2x^2 - 20x - 15$ without graphing the parabola.

a. (5, 35)
c. (–5, –40)
b. (–5, 35)
d. (–5, 10)

____ 23. Which of the following is equivalent to $\frac{(t^4)^6}{t^8}$?

a. t^{16}
c. t^3
b. t^2
d. t^{10}

____ 24. There are 5000 yeast cells in a culture. The number of cells grows at a rate of 20% per day. The function that models the growth of the yeast cells is $N(d) = N_0(1 + r)^d$, where *N* is the number of yeast cells *d* days after the culture is started, N_0 is the initial population, and *r* is the growth rate. Which of the following is a correct model for the yeast cell population?

a. $N(d) = 5000(1 + 0.2)^d$
c. $N(d) = 5000(1 + 20)^d$
b. $N(d) = 5000(0.2)^d$
d. $N(d) = 5000(20)^d$

____ 25. Which shows the type of function matched with the correct degree?

a. linear; 2
c. linear; 0
b. quadratic; 4
d. quadratic; 2

____ 26. Jerome would like to take a vacation to Costa Rica during March break, 9 months from today. The trip will cost $1860. He plans on making 8 monthly payments into a fund with a rate of 5.4%/a compounded monthly. What size payment does he need to make in order to have enough money for the trip?

a. $227.06
c. $196.74
b. $228.86
d. $195.39

____ 27. The equation of the axis of the function $y = -2\sin(x - 30^\circ) + 3$ is

a. x = -2
c. x = 3
b. y = 2
d. y = 3

____ 28. If the point (-2, -3) is on the graph of $y = f(x)$, what is the value of $f(-2)$?

a. -3
c. 0
b. -2
d. 3

____ 29. Which of the following is equivalent to $\frac{1}{9^{-4}}$?

a. $-\frac{1}{36}$
c. -9^4
b. 9^4
d. -36

____ 30. A function *g* is defined by $g(x) = x^2 - 9x + 18$. Evaluate g(2n).

a. $2n^2 - 18n + 18$
c. $4n^2 - 36n + 18$
b. $\frac{n^2}{2} - \frac{9}{2}n + 9$
d. $2n^2 - 36n + 18$

____ 31. Nancy can see four buildings from where she is standing. Given the following angles of elevation to the top of each building and her distance from the base of each building, which is the tallest?

a. 36°, 53 m
c. 47°, 40 m
b. 52°, 36 m
d. 58°, 28 m

____ 32. Write $\left(\sqrt{36}\right)^5$ in exponential form.

a. $36^{\frac{5}{2}}$
c. $6^{\frac{2}{5}}$
b. $36^{\frac{2}{5}}$
d. $6^{\frac{5}{2}}$

____ 33. What is the missing factor?

$27k^2 + 18k + 3 = 3(?)^2$

a. $2x + 1$
c. $9x + 6$
b. $x + 3$
d. $3x + 1$

____ 34. What can be modelled by a sinusoidal function?

a. the temperature of a cooler with respect to time
b. the motion of a kite with respect to time
c. the balance of a mortgage with respect to time
d. the height of a boy on a swing with respect to time

____ 35. Which function includes a translation of 3 units to the left?

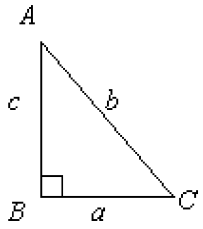
a. $f(x) = (x + 3)^2 + 1$
c. $f(x) = (x - 3)^2 + 1$
b. $f(x) = 3x^2 + 1$
d. $f(x) = (x + 1)^2 - 3$

____ 36. A quadratic function in standard form will have one real root when

a. $b^2 - 4ac > 0$
c. $b^2 - 4ac = 0$
b. $b^2 - 4ac < 0$
d. $a^2 - 4bc > 0$

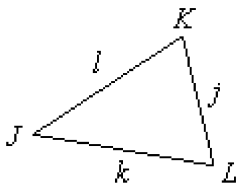
____ 37. In about how many years will $700 grow to $1200 if it is invested at 7% compounded annually?

a. 5
c. 7
b. 6
d. 8



____ 38. Using the figure above and the given values for $\angle C$ and a, determine which would have the largest side c.

a. $\angle C = 43°$, $a = 24$ cm
c. $\angle C = 49°$, $a = 25$ cm
b. $\angle C = 52°$, $a = 23$ cm
d. $\angle C = 46°$, $a = 26$ cm



____ 39. Given the figure above, if $l = 3.4$, $\angle J = 28°$, and $j = 3.2$, use the sine law to determine $\angle L$ to the nearest degree.

a. 60° c. 27°
b. 30° d. 26°

____ 40. The relation that is not a function is

a. {(-1, 5), (0, 6), (3, 10), (4, -1)} c. {(1, 2), (2, 3), (3, 2), (4, 1)}
b. {(2, -5), (5, -7), (2, -9), (7, 0)} d. {(-5, 0)}

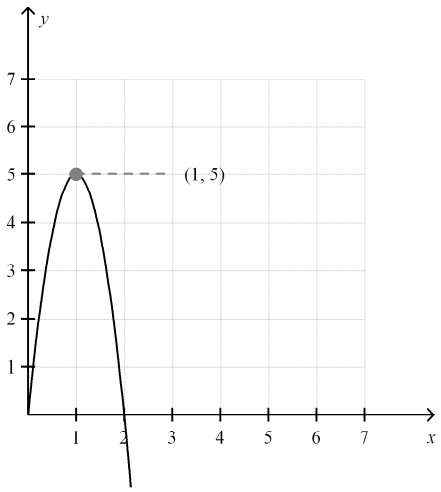
____ 41. Temperature and elevation are related. The average temperature at the summit of Mount Everest in July is 19 °C. The average Temperature at the Khumbo Glacier Base Camp in July is –3 °C. Which is the dependant variable?

a. temperature c. elevation
b. location d. mountain

____ 42. Functions of the form $g(x) = a(x - h)^2$ can be graphed by applying the appropriate transformations, one at a time, to the graph of

a. $f(x) = 2x$ c. $f(x) = (x - 1)^2$
b. $f(x) = x^2$ d. $f(x) = x + 2$

____ 43. A volleyball is hit straight upward. The graph shows its height, $h(t)$, in metres, at time t. Which is the function, in factored form, that estimates the height of the volleyball at any given time?



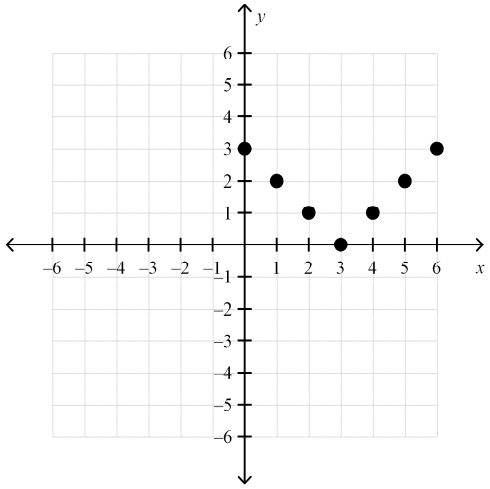
a. $x(x - 2)$ c. `$-5(x - 2)$
b. $-5x(x + 2)$ d. $-5x(x - 2)$

____ 44. A skateboard company models its profit with the function $P(x) = -2x^2 + 13x - 15$, where x is the number, in thousands, that the company sells, and $P(x)$ is the profit in tens of thousands of dollars. How many skateboards must the company sell to break even? Use factoring to solve.

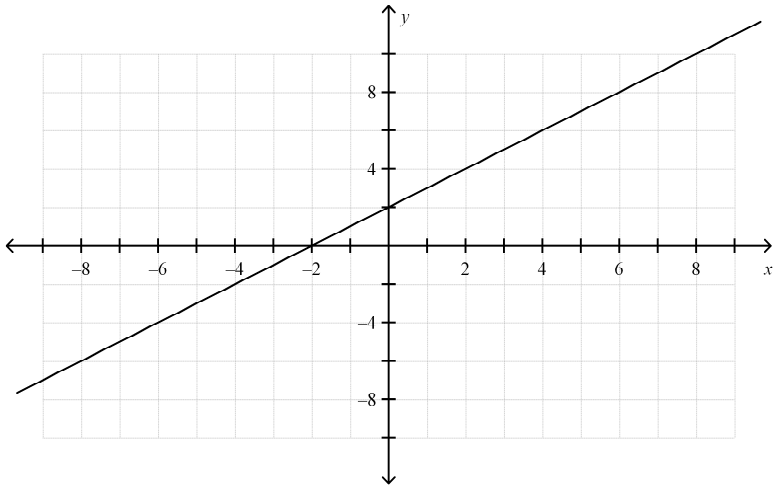
a. at 1500 and 5000 skateboards
b. at 150 and 500 skateboards
c. at 1.5 and 5 skateboards
d. at 1500 and 50 000 skateboards

Short Answer

45. What are the domain and range of the function?

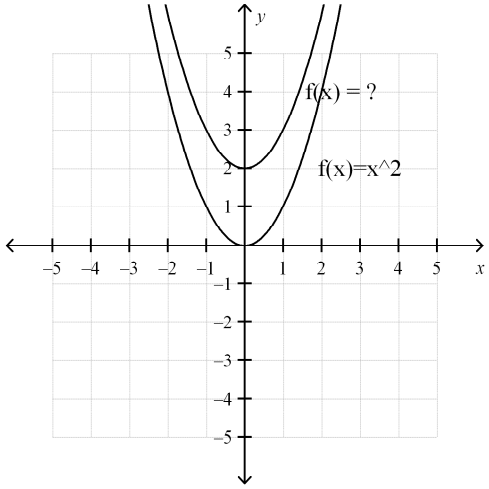


46. The graph of $y = f(x)$ is shown below. Evaluate $f(7)$.

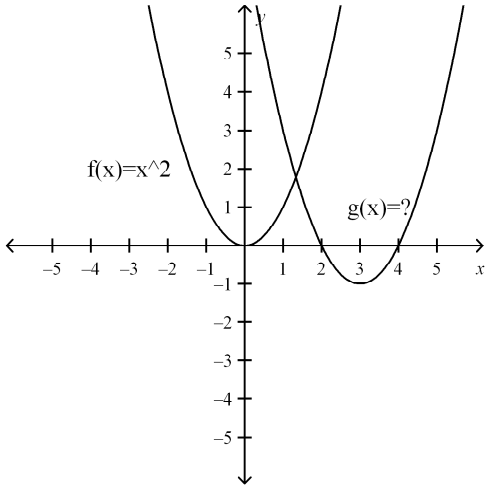


47. Name a function to describe each graph.

GRAPH A



GRAPH B



48. What are the domain and range of $h(x) = -(x-2)^2 + 3$?

49. Factor the polynomial fully.
$-6x^2 - 15x + 9$

50. Factor the polynomial.
$y^2 - 7y - 30$

51. Draw a rectangle with an area of $x^2 - 9x - 36$. Label the dimensions.

52. Express the quadratic function in standard form.
$f(x) = -(x-2)(x-4)$

53. For the quadratic function below, determine the coordinates of the vertex without graphing.
$g(x) = (2x+1)(x-2)$

54. A football is kicked into the air. The height of the football is modelled by $h(t) = -5t^2 + 16t + 1$, where $h(t)$ is the height in metres and t is the time in seconds from its release. When will the football first reach a height of 13 metres?

55. At a craft store, the weekly revenue function for floral wire sold can be modelled with $R(w) = -2w^2 + 20w + 2400$, where both the revenue $R(x)$, and the cost, w, of a roll of floral wire are in dollars. According to the model, what cost will give the maximum revenue?

56. John hits a golf ball into the ocean from a cliff that is 90 metres high. The function $h(t) = -5t^2 + 15t - 90$ gives the approximate height of the golf ball above the water, where $h(t)$ is the height in metres and t is the time in seconds. When will the ball hit the water?

57. Use factoring to solve $-x^2 - x + 12 = 0$. Show your work.

58. Write the factored and standard forms for a quadratic equation with x-intercepts of -5 and -3 and a y-intercept of 1.8.

59. Does the function $f(x) = -2(x + 6)^2 + 1$ have a maximum or a minimum value? Explain how you decided.

60. Write the function $f(x) = 3(x + 6)^2 - 7$ in standard form.

61. Write the equation of the quadratic function in vertex and standard form whose vertex is at (–1, 6) and that passes through (2, 24).

62. Factor $x^2 - 16x + 64$.

63. Complete the square on $y = x^2 - 16x - 10$.

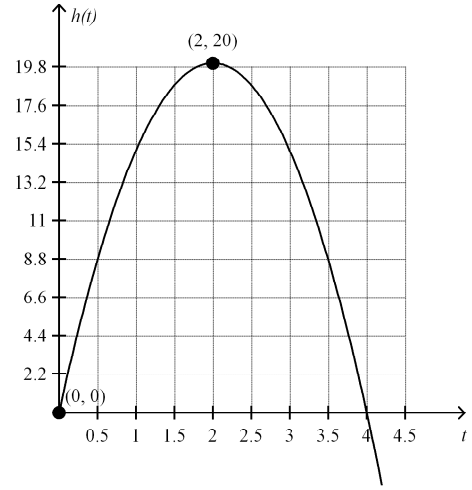
64. Complete the square on $y = 4x^2 + 24x - 13$.

65. Complete the square to write the function $f(x) = -2x^2 + 5x - 16$ in vertex form. State the vertex.

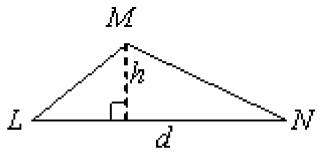
66. Use the quadratic formula to solve $-8x^2 - 5x + 3 = 0$. Round your answer to two decimal places. If there is no real solution, say so.

67. Use the quadratic formula to solve $12x^2 + 4x + 13 = 0$. Round your answer to two decimal places. If there is no real solution, say so.

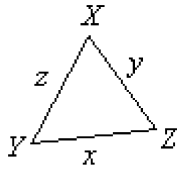
68. The graph shows the height of a football that is kicked for a field goal, where time, t, is in seconds and height, $h(t)$, is in metres. Use the graph to determine an algebraic model.



69. A quadratic function has a vertex located at (2, –8) and a y-intercept of –18. Write the standard form of the quadratic equation.

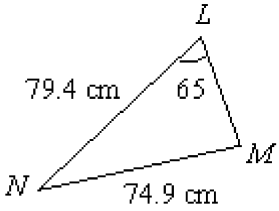


70. If sides $\overline{LM}$ and $\overline{MN}$ of triangle LMN, in the figure above, are 15 cm and 24 cm, respectively, and angles $\angle L$ and $\angle N$ are 49° and 28°, respectively, what is length d? Round your answer to the nearest centimetre.

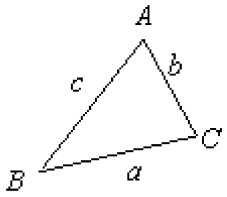


71. Given the figure above, if $\angle Y = 56°$, $\angle Z = 68°$, and y = 24 cm, what are the other two sides of triangle XYZ to the nearest tenth of a centimetre?

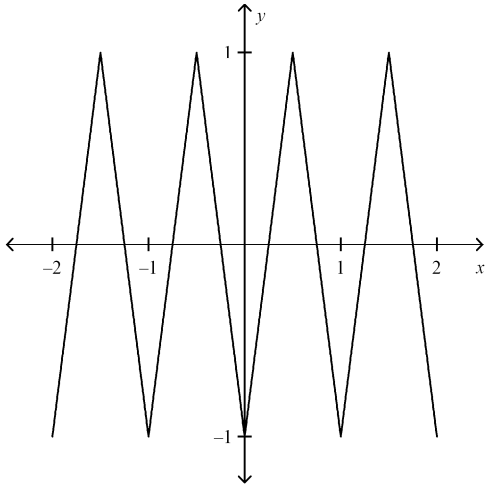
72. Solve the triangle given below. Round lengths to the nearest tenth of a centimetre and angles to the nearest degree.



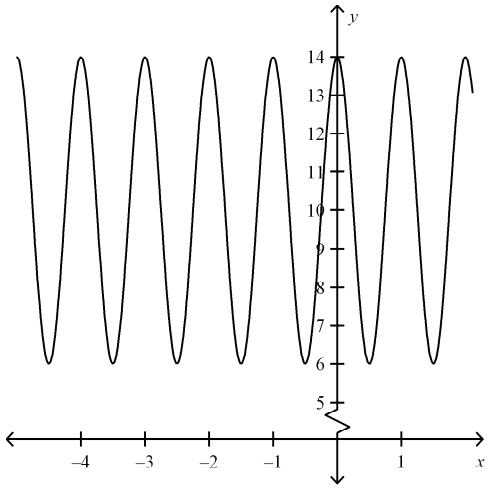
73. Using triangle *ABC*, if $a = 6.75$ cm, and $c = 7.50$ cm, and $\angle B = 35°$, solve the triangle using the cosine law. Round lengths to the nearest hundredth of a metre and angles to the nearest degree.



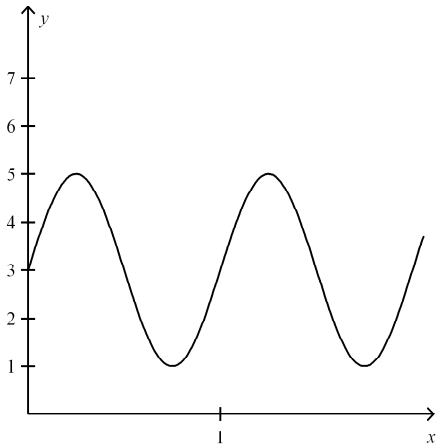
74. What is the period of the function? How many cycles are shown?



75. What is the amplitude of the graph? What is the equation of the axis?



76. Find the amplitude, period and equation of axis of the sinusoidal function.



77. Simplify. Write as a single power: $\dfrac{(3^4)^3}{3^7(3^2)}$.

78. Simplify: $b^8(b^7)^3$.

79. Simplify, and write as a single power with a positive exponent: $\left(\dfrac{9}{9^{-3}}\right)^3\left(\dfrac{9^4}{9^{-2}}\right)$.

80. Simplify and write as a single power with a positive exponent: $\dfrac{c^{-3}(c^7c^3)^{-1}}{c^{-2}c^8}$.

81. Simplify, and express using positive exponents: $\left((w^{-12})^{-\frac{1}{3}}\right)^{\frac{3}{4}}$.

82. Write $\sqrt[4]{256^3}$ in exponential form.

83. Write $(216)^{\frac{2}{3}}$ in radical form.

84. An antique car was purchased for $\$V_0$ in 1985. It appreciates in value by 2.85% each year. Write an equation that models *V*, the value of the car, in *t* years since 1985.

85. A rubber ball is dropped from a height of 10 m. It bounces to a height that is 85% of its previous maximum height after each bounce. After how many bounces will the height of the ball be about 5 m?

86. Light intensity in a lake is reduced by 9% per metre of depth, relative to the light intensity at the surface. What is the light intensity 18 m below the surface of the lake? Round your answer to the nearest hundredth of a percent.

87. Calculate the simple interest due at the end of 30 months if $10 575 is borrowed at a rate of 3.75%.

88. Gwen wants her investment to be worth $12 000 in 5 years. The bank will give her 7%/a interest compounded annually. How much does Gwen have to invest now? Round your answer to the nearest cent.

89. Brian took out a loan of $5500 for his university tuition. How much will he have to pay back at the end of 4 years if the interest on the loan is 7.9%/a compounded semi-annually?

90. Jocelyn wants to build up a fund of $24 000 over the next 5 years for a down payment on a townhouse.She wants to make regular quarterly deposits into an account that earns 5%/a compounded quarterly. How much should she deposit every 3 months?

91. How much should be deposited into an account to set up an annuity that will provide equal payments of $140 every 3 months over the next 7 years? The annuity will earn 6.2%/a compounded quarterly.

Problem

92. a) Factor the expression $6x^2 - 4x + 3xy - 2y$.
    b) How can grouping the terms in this expression help with factoring?

93. List the five key values of $f(x) = \sin x$ as ordered pairs (x, y) and sketch the function using these points.

94. Sketch a graph of the function $\sin(x - 45°) + 2$.

95. Sketch a graph of the function $f(x) = -2\sin x$.

MCF 3M Practice Exam
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 REF: Knowledge and Understanding
   OBJ: 6.6 - More Transformations of sin x: f(x) = a sin x
2. ANS: A PTS: 1 REF: Knowledge and Understanding
   OBJ: 6.2 - Periodic Behaviour
3. ANS: B PTS: 1 REF: Knowledge and Understanding
   OBJ: 6.6 - More Transformations of sin x: f(x) = a sin x
4. ANS: D PTS: 1 REF: Knowledge and Understanding
   OBJ: 7.4 - Working with Rational Exponents
5. ANS: C PTS: 1 REF: Knowledge and Understanding
   OBJ: 4.4 - Investigating the Nature of the Roots
6. ANS: A PTS: 1 REF: Knowledge and Understanding
   OBJ: 6.4 - Comparing Sinusoidal Functions
7. ANS: D PTS: 1 REF: Knowledge and Understanding
   OBJ: 2.3 - Factoring Quadratic Expressions: x^2 + bx +c
8. ANS: C PTS: 1 REF: Knowledge and Understanding
   OBJ: 7.4 - Working with Rational Exponents
9. ANS: A PTS: 1
10. ANS: C PTS: 1
11. ANS: B PTS: 1 REF: Application
    OBJ: 8.3 - Compound Interest: Determining Present Value
12. ANS: B PTS: 1 REF: Application
    OBJ: 8.2 - Compound Interest: Determining Future Value
13. ANS: C PTS: 1 REF: Knowledge and Understanding
    OBJ: 7.7 - Problems Involving Exponential Decay
14. ANS: D PTS: 1
15. ANS: A PTS: 1 REF: Knowledge and Understanding
    OBJ: 6.6 - More Transformations of sin x: f(x) = a sin x
16. ANS: C PTS: 1 REF: Knowledge and Understanding
    OBJ: 7.2 - The Laws of Exponents
17. ANS: D PTS: 1 REF: Thinking
    OBJ: 8.2 - Compound Interest: Determining Future Value
18. ANS: A PTS: 1 REF: Knowledge and Understanding
    OBJ: 4.3 - Solving Quadratic Equations Using the Quadratic Formula
19. ANS: B PTS: 1 REF: Knowledge and Understanding
    OBJ: 8.1 - Investigating Interest and Rates of Change
20. ANS: A PTS: 1 REF: Thinking
    OBJ: 8.2 - Compound Interest: Determining Future Value
21. ANS: B PTS: 1 REF: Knowledge and Understanding
    OBJ: 7.7 - Problems Involving Exponential Decay
22. ANS: B PTS: 1 REF: Knowledge and Understanding
    OBJ: 4.2 - Relating the Standard and Vertex Forms: Completing the Square

23. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 7.2 - The Laws of Exponents
24. ANS: A PTS: 1 REF: Communication
OBJ: 7.6 - Solving Problems Involving Exponential Growth
25. ANS: D PTS: 1 REF: Knowledge and Understanding
OBJ: 1.2 - Comparing Rates of Change in Linear and Quadratic Functions
26. ANS: B PTS: 1 REF: Application
OBJ: 8.5 - Regular Annuities: Determining Future Value
27. ANS: D PTS: 1
28. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 1.3 - Working with Function Notation
29. ANS: B PTS: 1 REF: Knowledge and Understanding
OBJ: 7.3 - Working with Integer Exponents
30. ANS: C PTS: 1 REF: Knowledge and Understanding
OBJ: 1.3 - Working with Function Notation
31. ANS: B PTS: 1 REF: Thinking
OBJ: 5.1 - Applying the Primary Trigonometric Ratios
32. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 7.4 - Working with Rational Exponents
33. ANS: D PTS: 1 REF: Knowledge and Understanding
OBJ: 2.5 - Factoring Quadratic Expressions: Special Cases
34. ANS: D PTS: 1 REF: Application
OBJ: 6.3 - Investigating the Sine Function
35. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 1.5 - Graphing Quadratic Functions by Using Transformations
36. ANS: C PTS: 1
37. ANS: D PTS: 1 REF: Thinking
OBJ: 8.2 - Compound Interest: Determining Future Value
38. ANS: B PTS: 1 REF: Thinking
OBJ: 5.1 - Applying the Primary Trigonometric Ratios
39. ANS: B PTS: 1 REF: Application
OBJ: 5.3 - Investigating and Applying the Sine Law in Acute Triangles
40. ANS: B PTS: 1
41. ANS: A PTS: 1 REF: Application
OBJ: 1.1 - The Characteristics of a Function
42. ANS: B PTS: 1 REF: Knowledge and Understanding
OBJ: 1.6 - Using Multiple Transformations to Graph Quadratic Functions
43. ANS: D PTS: 1 REF: Application
OBJ: 3.2 - Relating the Standard and Factored Forms
44. ANS: D PTS: 1 REF: Application
OBJ: 3.5 - Solving Problems Involving Quadratic Functions

SHORT ANSWER

45. ANS:
D = {0, 1, 2, 3, 4, 5, 6}
R = {0, 1, 2, 3}

PTS: 1 REF: Knowledge and Understanding
OBJ: 1.1 - The Characteristics of a Function

46. ANS:
9

PTS: 1 REF: Knowledge and Understanding
OBJ: 1.3 - Working with Function Notation

47. ANS:
Answers may vary. For example:
Graph A: $f(x) = -x^2 + 2$
Graph B: $g(x) = (x - 3)^2 - 1$

PTS: 1 REF: Thinking
OBJ: 1.5 - Graphing Quadratic Functions by Using Transformations

48. ANS:
D = $\{x \in \mathbf{R}\}$
R = $\{y \leq 3 | y \in \mathbf{R}\}$

PTS: 1 REF: Knowledge and Understanding
OBJ: 1.7 - The Domain and Range of a Quadratic Function

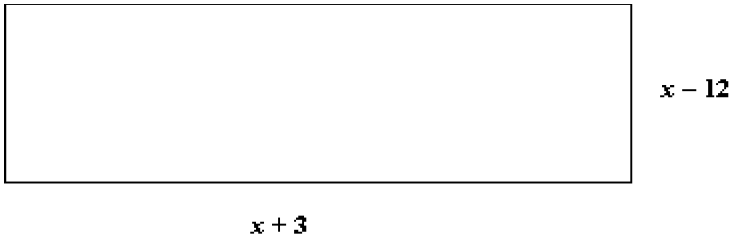
49. ANS:
$-3(2x - 1)(x + 3)$

PTS: 1 REF: Knowledge and Understanding
OBJ: 2.2 - Factoring Polynomials: Common Factoring

50. ANS:
$(y - 10)(y + 3)$

PTS: 1 REF: Knowledge and Understanding
OBJ: 2.3 - Factoring Quadratic Expressions: x^2 + bx +c

51. ANS:



PTS: 1 REF: Communication
OBJ: 2.3 - Factoring Quadratic Expressions: x^2 + bx +c

52. ANS:
$-x^2 + 6x - 8$

PTS: 1 REF: Knowledge and Understanding
OBJ: 3.2 - Relating the Standard and Factored Forms

53. ANS:
(0.75, –3.125)

PTS: 1 REF: Knowledge and Understanding
OBJ: 3.2 - Relating the Standard and Factored Forms

54. ANS:
1.2 s

PTS: 1 REF: Application OBJ: 3.3 - Solving Quadratic Equations by Graphing

55. ANS:
$5

PTS: 1 REF: Application OBJ: 3.4 - Solving Quadratic Equations by Factoring

56. ANS:
6 s

PTS: 1 REF: Application OBJ: 3.4 - Solving Quadratic Equations by Factoring

57. ANS:
$x = -4$ and $x = 3$
$-(x^2 + x - 12)$
$-(x - 4)(x + 3)$

PTS: 1 REF: Knowledge and Understanding
OBJ: 3.5 - Solving Problems Involving Quadratic Functions

58. ANS:
$y = 0.12(x + 5)(x + 3)$
$y = 0.12x^2 + 0.96x + 1.8$

PTS: 1 REF: Knowledge and Understanding
OBJ: 3.6 - Creating a Quadratic Model from Data

59. ANS:
It has a maximum because $a < 0$.

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.1 - The Vertex Form of a Quadratic Function

60. ANS:
$f(x) = 3x^2 + 36x + 101$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.1 - The Vertex Form of a Quadratic Function

61. ANS:
Vertex form: $f(x) = 2(x+1)^2 + 6$; Standard form: $f(x) = 2x^2 + 4x + 8$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.1 - The Vertex Form of a Quadratic Function

62. ANS:
$(x-8)^2$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.2 - Relating the Standard and Vertex Forms: Completing the Square

63. ANS:
$y = (x-8)^2 - 74$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.2 - Relating the Standard and Vertex Forms: Completing the Square

64. ANS:
$y = 4(x+3)^2 - 49$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.2 - Relating the Standard and Vertex Forms: Completing the Square

65. ANS:
$f(x) = -2\left(x - \frac{5}{4}\right)^2 - \frac{103}{8}; \left(\frac{5}{4}, -\frac{103}{8}\right)$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.2 - Relating the Standard and Vertex Forms: Completing the Square

66. ANS:
–1 and 0.38

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.3 - Solving Quadratic Equations Using the Quadratic Formula

67. ANS:
no real solution

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.3 - Solving Quadratic Equations Using the Quadratic Formula

68. ANS:
$h(t) = -5(t-2)^2 + 20$

PTS: 1 REF: Application OBJ: 4.5 - Using Quadratic Function Models to Solve Problems

69. ANS:
$y = -2.5x^2 + 10x - 18$

PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Using the Vertex Form to Create Quadratic Function Models from Data

70. ANS:
31 cm

PTS: 1 REF: Application OBJ: 5.2 - Solving Problems by Using Right-Triangle Models

71. ANS:
$z = 26.8$ cm
$x = 24.0$ cm

PTS: 1 REF: Application
OBJ: 5.3 - Investigating and Applying the Sine Law in Acute Triangles

72. ANS:
$\angle M = 74°$
$\angle N = 41°$
$\overline{LM} = 54.2$ cm

PTS: 1 REF: Application
OBJ: 5.3 - Investigating and Applying the Sine Law in Acute Triangles

73. ANS:
$b = 4.34$ cm
$\angle A = 63°$
$\angle C = 82°$

PTS: 1 REF: Application
OBJ: 5.4 - Investigating and Applying the Cosine Law in Acute Triangles

74. ANS:
The period of the function is 1. There are 4 cycles.

PTS: 1 REF: Application OBJ: 6.2 - Periodic Behaviour

75. ANS:
The amplitude is 4. The equation of the axis is $y = 10$.

PTS: 1 REF: Thinking OBJ: 6.3 - Investigating the Sine Function

76. ANS:
The amplitude is 2, the period is 1 and the equation of the axis is $y = 3$.

PTS: 1 REF: Knowledge and Understanding
OBJ: 6.4 - Comparing Sinusoidal Functions

77. ANS:
3^3

PTS: 1 REF: Knowledge and Understanding OBJ: 7.2 - The Laws of Exponents

78. ANS:
b^{29}

PTS: 1 REF: Knowledge and Understanding OBJ: 7.2 - The Laws of Exponents

79. ANS:
9^{18}

PTS: 1 REF: Knowledge and Understanding
OBJ: 7.3 - Working with Integer Exponents

80. ANS:
$\frac{1}{c^{19}}$

PTS: 1 REF: Knowledge and Understanding
OBJ: 7.3 - Working with Integer Exponents

81. ANS:
w^3

PTS: 1 REF: Knowledge and Understanding
OBJ: 7.4 - Working with Rational Exponents

82. ANS:
$256^{\frac{3}{4}}$

PTS: 1 REF: Knowledge and Understanding
OBJ: 7.4 - Working with Rational Exponents

83. ANS:
$\sqrt[3]{216^2}$

PTS: 1 REF: Knowledge and Understanding
OBJ: 7.4 - Working with Rational Exponents

84. ANS:
$V(t) = V_0(1.0285)^t$

PTS: 1 REF: Communication
OBJ: 7.6 - Solving Problems Involving Exponential Growth

85. ANS:
4 bounces

PTS: 1 REF: Thinking OBJ: 7.7 - Problems Involving Exponential Decay

86. ANS:
18.31%

PTS: 1 REF: Application OBJ: 7.7 - Problems Involving Exponential Decay

87. ANS:
$991.41

PTS: 1 REF: Knowledge and Understanding
OBJ: 8.1 - Investigating Interest and Rates of Change

88. ANS:
\$8555.83

PTS: 1 REF: Application OBJ: 8.2 - Compound Interest: Determining Future Value

89. ANS:
\$7498.23

PTS: 1 REF: Application OBJ: 8.2 - Compound Interest: Determining Future Value

90. ANS:
\$1063.69

PTS: 1 REF: Application OBJ: 8.5 - Regular Annuities: Determining Future Value

91. ANS:
\$3160.63

PTS: 1 REF: Knowledge and Understanding
OBJ: 8.6 - Regular Annuities: Determining Present Value

PROBLEM

92. ANS:
a) $6x^2 - 4x + 3xy - 2y$

$(6x^2 - 4x) + (3xy - 2y)$

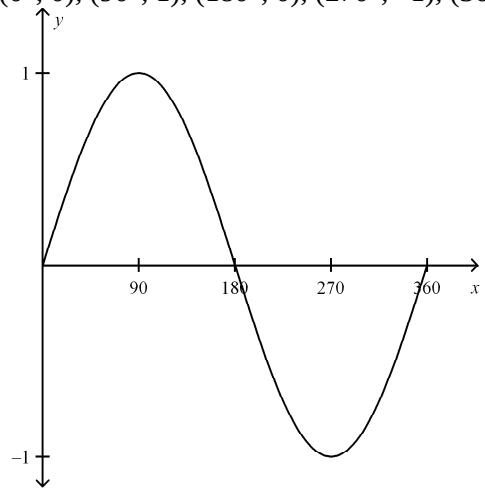
$2x(3x - 2) + y(3x - 2)$

$(3x - 2)(2x + y)$

b) Grouping the terms will allow you to see the common factor.

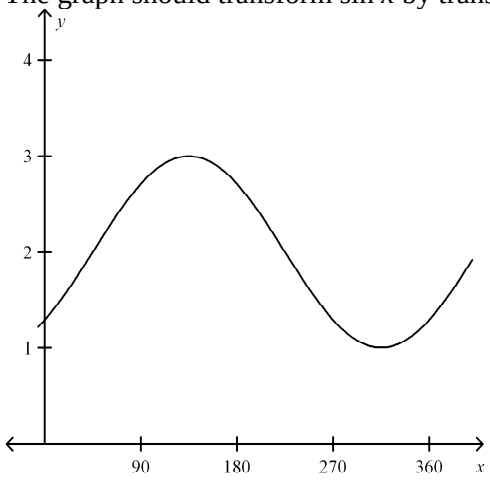
PTS: 1 REF: Communication
OBJ: 2.2 - Factoring Polynomials: Common Factoring

93. ANS:
(0°, 0), (90°, 1), (180°, 0), (270°, –1), (360°, 0)



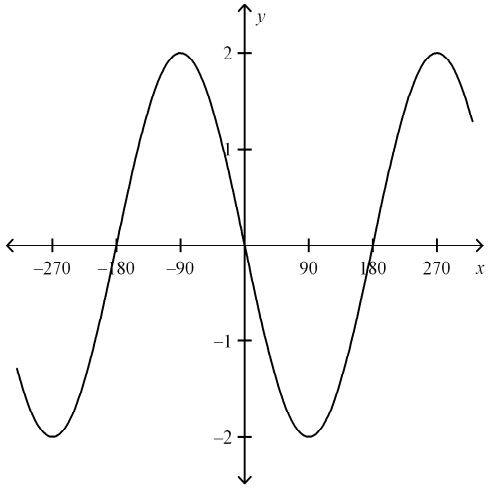
PTS: 1 REF: Thinking OBJ: 6.3 - Investigating the Sine Function

94. ANS:
The graph should transform sin *x* by translating up 2 units and to the right 45°.



PTS: 1 REF: Thinking
OBJ: 6.5 - Transformations of the Sine Function: f(x) = sin(x - c) and f(x) = sin x + d

95. ANS:
The graph retains the same *x*-intercepts as sin *x*, but the amplitude is 2 and the function is reflected over the *x*-axis.



PTS: 1 REF: Thinking OBJ: 6.6 - More Transformations of sin x: f(x) = a sin x