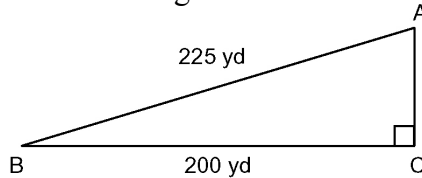Name: _____

Course End Review
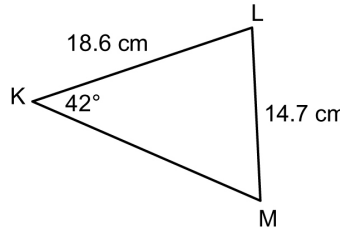### Foundations For College Mathematics

Trigonometry:

1.   A 12-m long ladder is resting against a wall. The top of the ladder is 10 m above the ground. What angle does the ladder make with the ground?
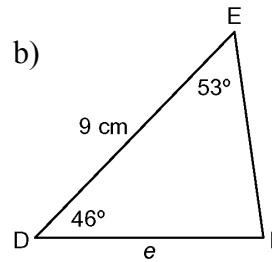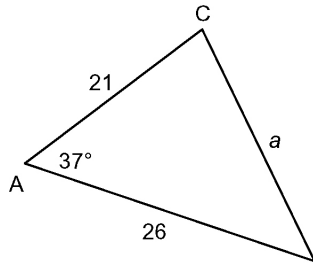
2.   Given ΛABC determine;
    (a)   angle B
    (b)   angle A
    (b)   side AC

3.   Given ΛKLM , determine:
    (a)   angle M
    (b)   angle L
    (c)   side KM

4.   Solve for the unknown in each triangle.
    a)   b)

5.   To measure the distance across a river, a surveyor took measurements and drew the diagram shown. Determine the distance from X to Y.
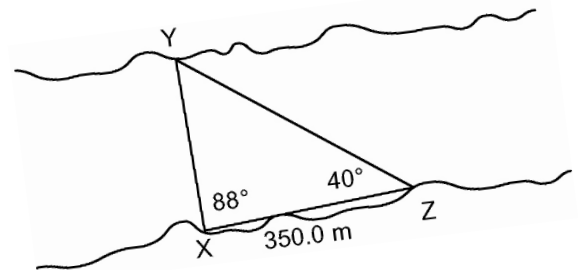
6.   Determine x (nearest angle or 1 decimal for length).
    (a)   (b)   (c)
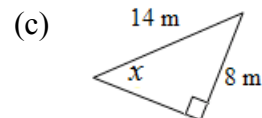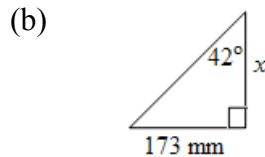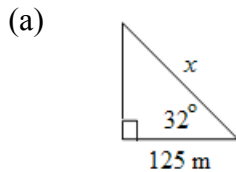
7.   Jason is flying his kite. He lets out 63 m of string and the wind takes his kite up to a point where the angle of elevation is 58°. Find the altitude of the kite to the nearest meter.

Probability:

8.   Gary rolls a die 50 times. He rolls an even number 22 times. What is the theoretical probability of rolling an odd number as:
      (a)   a fraction in lowest terms   (b)   as a decimal
      (c)   as a percent.

9.   A pencil case holds 3 pens, 4 pencils, 2 highlighters, and 2 markers.
      (a)   What is the probability of randomly selecting a pencil, expressed as a percent?
      (b)   What is the probability of selecting a marker or a highlighter?

10.   A regular deck of cards has 52 cards. Find the probability of each event, expressed as a fraction in lowest terms:
      (a)   Choosing a red ace   (b)   Choosing a jack
      (c)   Choosing a card below 5   (d)   Not choosing a black 6

11.   A basketball player made 135 of the 225 foul shots he took in 4 games.
   (a)   How many shots will he make in his next game if he attempts 30 foul shots?
      (b)   How many shots will he make this season if he attempts 2400 foul shots?

12.   The graph shows the results of repeatedly drawing one card from a deck of cards and replacing it after the outcome is recorded.

      (a)   How many times was a card selected from the deck?

      (b)   What is the probability drawing a black face card from the deck? b(reduced fraction)

Card Draw
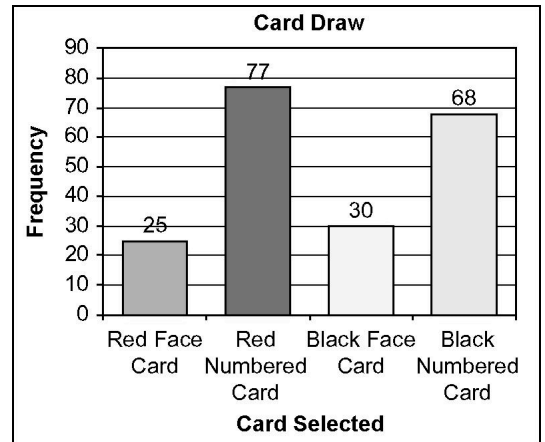
One Variable Statistics:

13.   Find the following given the data:
         55   75   37   81   87   37   64   41   47   71

      (a)   mean   (b)   median
      (c)   mode   (d)   range
      (e)   variance   (f)   standard deviation

14.   Mr. Johnson recorded the test scores of the students in his geography class.
      (a)   Display the data using a histogram.
      (b)   What type of distribution does the graph represent?

| Test Score	Frequency
[30, 40)	0
[40, 50)	2
[50, 60)	5
[60, 70)	6
[70, 80)	11
[80, 90)	8
[90, 100)	3

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Quadratic Relations I:

15. What is the equation of the transformed parabola.
    (a) The graph of $y = x^2$ is stretched by a factor of 2 and is shifted down 2 units.
    (b) The graph of $y = x^2$ is compressed by a factor of 0.6, and reflected in the x-axis.
    (c) The graph of $y = x^2$ is reflected in the x-axis, and shifted left 10 units and up 1 unit.

16. Match each relation with its graph.
    (a) $y = 0.5(x - 3)^2 + 2$
    (b) $y = 2(x + 3)^2 - 2$
    (c) $y = (x - 4)^2 - 1$
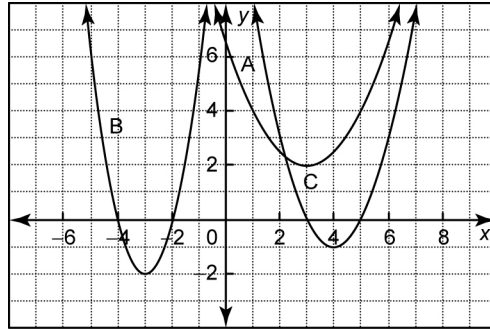
17. List the transformations relative to the graph of $y = x^2$.
    (a) $y = 2(x - 3)^2$ (b) $y = (x + 4)^2 - 1$
    (c) $y = -0.5x^2 + 3$ (d) $y = 0.3(x - 2)^2 - 1$

18. For each quadratic relation, state:
    i.   the vertex   ii. direction of opening
    iii. maximum or minimum value
    (a) $y = 4(x - 2)^2 + 5$ (b) $y = -0.3(x + 2)^2 - 3$
    (c) $y = -2(x - 3)^2$ (d) $y = 0.1x^2 - 3$

19. Match each relation with its graph to the right.
    (a) $y = -2(x + 1)^2 - 4$
    (b) $y = -(x - 1)^2 + 4$
    (c) $y = -0.5(x + 1)^2 - 4$
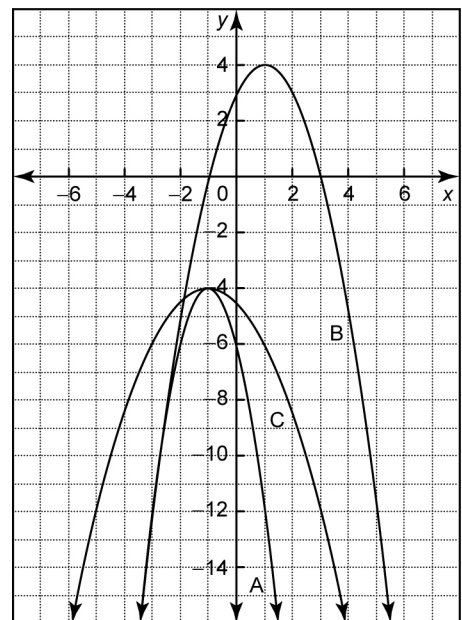
20. A pebble is fired from a sling shot from the top of a small hill. The path of the pebble can be modelled by the relation $h = -5.25(t - 4)^2 + 96$, where h is the height of the pebble in metres and t is the time in seconds after the pebble was fired.
    (a) Find the vertex of the parabola.
    (b) How long will it take the pebble to reach its maximum height?
    (c) What is the maximum height?
    (d) What is the height if the small hill?
    (e) How high was the pebble from the ground at 6 seconds?

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21. A small child dropped a stone from a bridge over a river. The path of the stone can be modelled by the relation $h = -4.9t^2 + 45$, where h is the height above the water in meters and t is the time in seconds after the stone was dropped.
    (a)   From what height was the stone dropped?
    (b)   How far had the stone fallen after 2 s?

Quadratic Relations II:

22.   Expand and simplify:
      (a) $(x + 6)(x - 2)$ (b) $(x + 6)(x - 6)$
      (c) $(3x + 4)(2x - 1)$ (d) $(5x + 2)^2$

23.   Factor fully.
      (a) $x^2 + 12x + 27$ (b) $x^2 + 2x - 48$
      (c) $x^2 - 11x + 28$ (d) $x^2 - 169$
      (e) $4x^2 - 49$ (f) $2x^2 + 4x - 48$
      (g) $3x^2 - 18x - 21$ (h) $-4x^2 - 20x + 96$

24.   Write each equation in standard form.
      (a) $y = 3(x - 6)^2 + 4$ (b) $y = -(x + 10)^2 - 3$
      (c) $y = (2x - 3)(5x + 1)$ (d) $y = 3(x + 2)(x - 4)$

25.   Determine the vertex and the y-intercept for each equation in question 24(a) and 24(b).

26.   Write each equation in standard form then put into factored form.
      (a) $y = (x - 8)^2 - 16$ (b) $y = 2(x - 4)^2 - 8$
      (c) $y = -3(x + 3)^2 + 12$

27.   Determine the vertex, the y-intercept and the zeros (x-intercepts) for each equation in question 26.

28.   Determine the y-intercept for the relation $y = 2x^2 + 6x + 7$?

Exponents:

29.   Evaluate. Write all the decimal places.

      (a) 5^{-3} (b) 1.5^4 (c) 10500^0

      (d) -2^4 (e) $\dfrac{1}{3^{-2}}$ (f) $(-2)^4$

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30. Write as a single power first, and then express your answer as whole number or a fraction.

    (a) $2^3 \times 2$

    (b) $6^7 \times 6^{-3}$

    (c) $7^8 \div 7^5$

    (d) $4^3 \div 4^6$

    (e) $\left(3^2\right)^3$

    (f) $\left(2^4\right)^{-3}$

    (g) $9^{-2} \div 9^{-4}$

    (h) $6^9 \times 6^{-13} \times 6 \div 6^{-5}$

    (i) $5^7 \times 5^{-2} \times 5^{-5}$

    (j) $\left(\dfrac{3}{2}\right)^2 \times \left(\dfrac{3}{2}\right)^{-4}$

    (k) $\dfrac{4^{-4} \times 4^2}{4^3}$

    (l) $\left((-3)^2\right)^0$

31. Sketch each equation, describe the transformations, and identify the y-intercepts.

    (a) $y = \left(\dfrac{1}{3}\right)^x$

    (b) $y = 5^x$

    (c) $y = 2(3)^x$

    (d) $y = 2^x$

    (e) $y = \left(\dfrac{1}{2}\right)^x$

32. Complete the table of values for $y = 4^x$ and graph the relation.

x	y
-2	
-1	
0	
1	
2	

33. The fish population in a lake follows the relation: $A = A_o (2)^{\frac{t}{50}}$
    If the lake is stocked with 20000 fish today, how many will there be in 2 years?

34. The mass of a drug in milligrams (mg) in a person's bloodstream follows the relation:

    $M = 500\left(\dfrac{1}{2}\right)^{\frac{t}{4}}$, where t is the time in hours.

    (a) How much of the drug was given to the patient?

    (b) How much of the drug will be left in their bloodstream after 8 hours?

35. Write each expression as a positive single power.

    (a) $3^5 \times 3^7$

    (b) $\left(5^3\right)^{10}$

    (c) $\dfrac{7^3 \times 7}{7^7}$

    (d) $6^8 \div 6^6 + 2^2 \times 2^3$

    (e) $5^7 \times 5^{-2} \times 5^{-5}$

    (f) $\dfrac{2^7 \times 2^{-3}}{2^2}$

    (g) $\dfrac{3}{2^{-4}}$

    (h) $\dfrac{3^{-2}}{3^{-4}}$

    (i) $8^{-6} \div 8^{-7}$

36. Determine the y-intercepts for the graphs.

    (a) $y = 3^x$

    (b) $y = 5(3)^x$

37. The value of a painting increase with time according to the relation $V = 84\,000(1.2)^t$,
    where t is the number of years since 1947.

    (a) What was the value of the painting in 1947?

    (b) What was the value of the painting in 1987?

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Personal Finance:

38.   Jane repaid $1000 for her loan that was taken out at 6% compounded quarterly for 2 years.
    (a)   How much did she borrow?
    (b)   How much interest did she have to pay back?

39.   Determine the <u>interest</u> earned and the <u>final value</u> if:
    (a) $2100 invested for 3 years at 2% simple interest
    (b) $650 invested for 10 years at 3.5% simple interest

40.   Determine the <u>final value</u> of each investment:
    (a) $875 at 5% per year compounded quarterly for 6 years
    (b) $$2600 at 12% per year compounded monthly for 8 years

41.   Eric has $3000 to invest for 6 years. He has a choice of 2 plans.
    Plan A: 6.5% simple interest
    Plan B: 6.5% per year, compounded semi-annually
    (a)   Which plan should he choose?
    (b)   Explain your choice. (How much more interest will he earn with this plan?)

42.   Mark borrowed money for 3 years at 4% per year compounded quarterly. If he paid $7549.73 when he paid back the loan, how much did he borrow?

43.   Jeff's bank charges $12.00 for the first 10 transactions on his chequing account, and $1.25 for each additional transaction. If he made 21 transactions last month, how much was he charged in service fees?

44.   How much needs to be invested today to have $25 000 in 10 years, at 6% per year, compounded semi-annually?

45.   Marty borrowed money for 3 years at 4% per year, compounded quarterly. If he paid $7549.73 at the end of the 3 years, how much was the loan?

46.   For how many years would $3000 need to be invested at 4.2% per year, compounded semi-annually, to have $5000?

47.   David invests $4000 in a plan with interest compounded monthly. What yearly interest rate will increase his investment to $5000 after 5 years?

48.   The gas tank of a new hybrid car has a 45 L capacity. The fuel efficiency rating of the car is 2.7 L/100 km.
    (a)   How far can the car travel on one tank of gas?
    (b)   How much gas is needed for a 750 km trip?

49.   Consider the parabola to the right . Write an equation to represent the parabola. <u>Hint</u>: use vertex form.

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