# Foundations 20 Practice Final

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

____ 1. Justin gathered the following evidence.

17(22) = **3**7**4** 14(22) = **3**0**8** 36(22) = **7**4**2** 18(22) = **3**9**6**

Which conjecture, if any, is Justin most likely to make from this evidence?

a. When you multiply a two-digit number by 22, the last and first digits of the product are the digits of the original number.
b. When you multiply a two-digit number by 22, the first and last digits of the product are the digits of the original number.
c. When you multiply a two-digit number by 22, the first and last digits of the product form a number that is twice the original number.
d. None of the above conjectures can be made from this evidence.

____ 2. Which conjecture, if any, could you make about the sum of two even integers and one odd integer?

a. The sum will be an odd integer.
b. The sum will be an even integer.
c. The sum will be negative.
d. It is not possible to make a conjecture.

____ 3. Lila created the following table.

| **Multiples of 5** | 15 | 75 | 150 |
|---|---|---|---|
| **Sum of the Digits** | 6 | 12 | 6 |

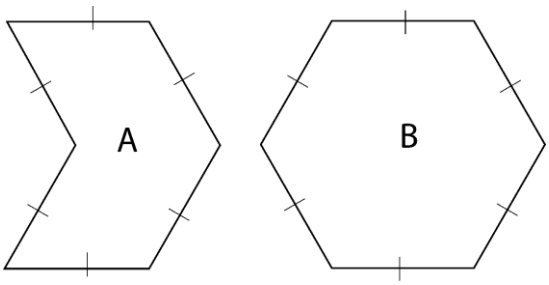
Based on this evidence, which conjecture might Lila make? Is the conjecture valid?

a. The sum of the digits of a multiple of 3, is a multiple of 6; no, this conjecture is not valid.
b. The sum of the digits of a multiple of 3 is a multiple of 6; yes, this conjecture is valid.
c. The sum of the digits of a multiple of 5 is a multiple of 6; yes, this conjecture is valid.
d. The sum of the digits of a multiple of 5, is a multiple of 6; no, this conjecture is not valid.

____ 4. Sasha made the following conjecture:

All polygons with six equal sides are regular hexagons.

Which figure, if either, is a counterexample to this conjecture? Explain.




a. Figure A is a counterexample, because all six sides are equal and it is a regular hexagon.
b. Figure B is a counterexample, because all six sides are equal and it is a regular hexagon.
c. Figure B is a counterexample, because all six sides are equal and it is not a regular hexagon.
d. Figure A is a counterexample, because all six sides are equal and it is not a regular hexagon.

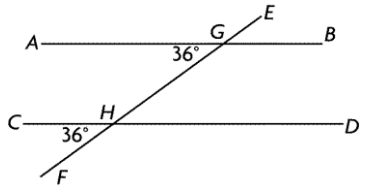
____ 5. All alligators are reptiles. All reptiles are covered with scales.
Tashi is a cat. What can be deduced about Tashi?

**1.** Tashi has scales.
**2.** Tashi is a reptile.

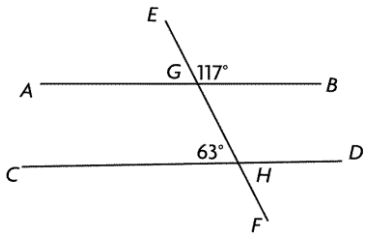
a. Choice 1 and Choice 2
b. Choice 1 only
c. Choice 2 only
d. Neither Choice nor Choice 2

____ 6. In which diagram(s) is *AB* parallel to *CD*?

**1.**

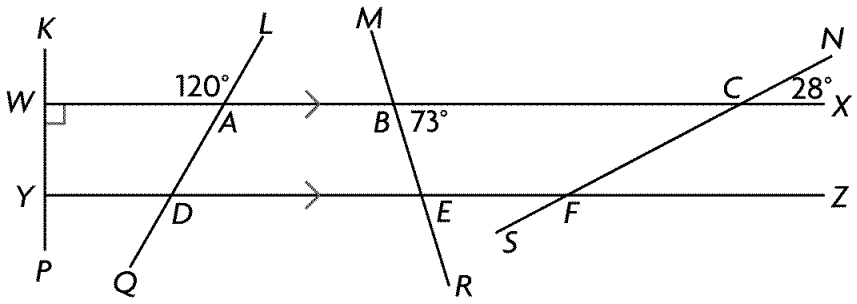



**2.**



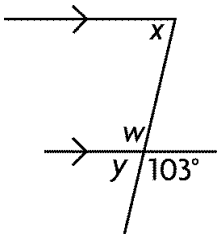

a. Choice 1 only
b. Choice 2 only
c. Choice 1 and Choice 2
d. Neither Choice 1 nor Choice 2

____ 7. Which angle property proves $\angle DAB = 120°$?



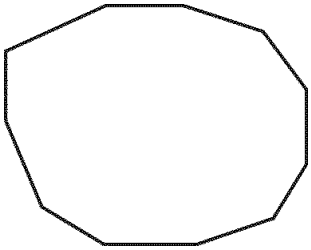
a. vertically opposite angles
b. alternate exterior angles
c. alternate interior angles
d. corresponding angles

____ 8. Which are the correct measures of the indicated angles?




a. $\angle w = 77°, \angle x = 77°, \angle y = 103°$
b. $\angle w = 77°, \angle x = 103°, \angle y = 103°$
c. $\angle w = 103°, \angle x = 77°, \angle y = 77°$
d. $\angle w = 103°, \angle x = 103°, \angle y = 77°$

____ 9. Determine the sum of the measures of the interior angles of this polygon.



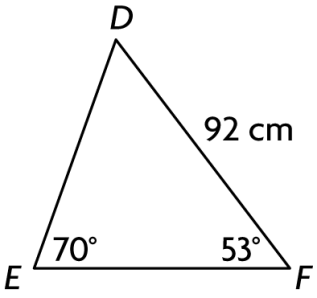
a. 1080°
b. 1260°
c. 1620°
d. 1440°

____ 10. Solve for the unknown side length. Round your answer to one decimal place.

$$\frac{q}{\sin 30°} = \frac{10.0}{\sin 80°}$$

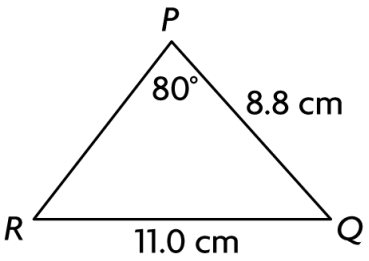
a. 5.0
b. 5.1
c. 20.3
d. 0.5

____ 11. Determine the length of *f* to the nearest tenth of a centimetre.



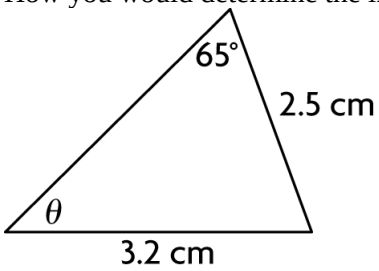

a. 78.6 cm
b. 79.0 cm
c. 79.4 cm
d. 78.2 cm

____ 12. Determine the measure of $\angle R$ to the nearest degree.




a. 52°
b. 54°
c. 50°
d. 56°

____ 13. How you would determine the indicated angle measure, if it is possible?

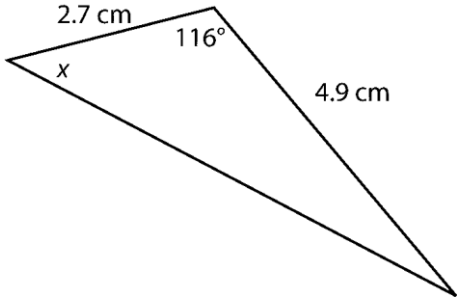



a. not possible
b. primary trigonometric ratios
c. the cosine law
d. the sine law

____ 14. Which one of the following equations is valid?

a. cos 36° = –cos 144°
b. cos 36° = –cos 36°
c. cos 36° = cos 144°
d. none of the above

____ 15. Which law could you use to determine the unknown angle in this triangle?




a. the sine law and the cosine law
b. the sine law only
c. neither the sine law nor the cosine law
d. the cosine law only

____ 16. In $\Delta FGH$, $GH = 4.5$ cm and $G = 15°$.
What is the height of the triangle from base *GF?*

a. 1.5 cm
b. 1.3 cm
c. 1.2 cm
d. 0.9 cm

____ 17. A pear orchard has 40 trees with these heights, given in inches.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 110 | 105 | 83 | 84 | 104 | 92 | 95 | 98 |
| 88 | 92 | 80 | 81 | 115 | 88 | 106 | 92 |
| 97 | 103 | 100 | 93 | 98 | 93 | 93 | 102 |
| 92 | 87 | 117 | 92 | 75 | 102 | 83 | 107 |
| 122 | 92 | 115 | 86 | 89 | 98 | 105 | 125 |

What value goes in the second row of this frequency table?

| Height (in.) | Frequency |
|---|---|
| 70–79 | 1 |
| 80–89 | |
| 90–99 | 14 |
| 100–109 | 9 |
| 110–119 | 4 |
| 120–129 | 2 |

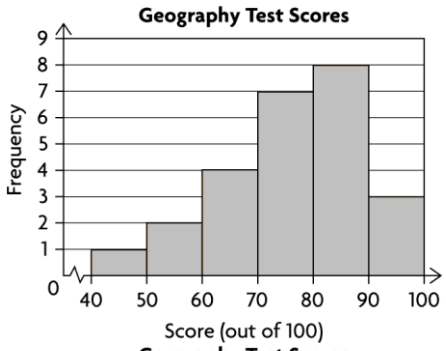
a. 13
b. 12
c. 10
d. 11

____ 18. Which histogram represents the following test scores?
Geography Test 3 Scores (our of 100)

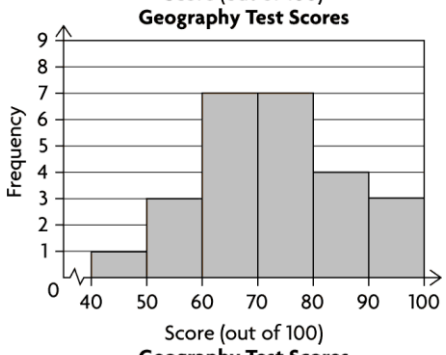
| | | | | |
|---|---|---|---|---|
| 92 | 85 | 78 | 67 | 54 |
| 92 | 83 | 78 | 65 | 53 |
| 90 | 83 | 77 | 62 | 50 |
| 88 | 80 | 75 | 62 | 48 |

86 80 68 60 42

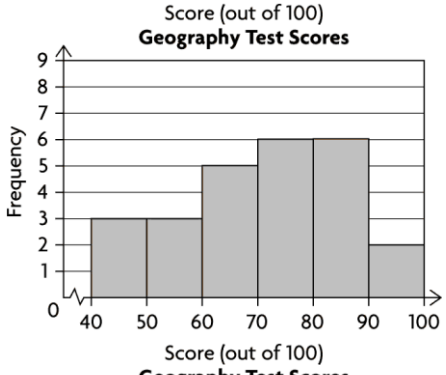
a.



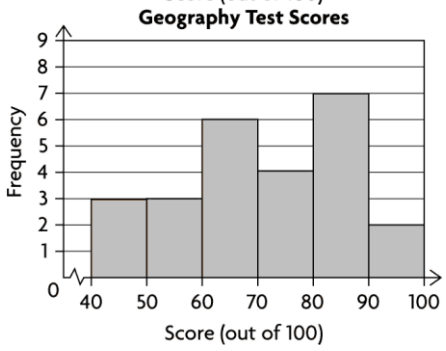

b.




c.




d.




____ 19. At the end of a bowling tournament, three friends analyzed their scores.
Lada's mean bowling score is 125 with a standard deviation of 27.
Quinn's mean bowling score is 182 with a standard deviation of 28.
Kamal's mean bowling score is 170 with a standard deviation of 20.

Who is the more consistent bowler?

a. Impossible to tell.

b. Quinn
c. Kamal
d. Lada

____ 20. A set of data is normally distributed. What percent of the data is within one standard deviation of the mean?

a. about 95%
b. about 50%
c. about 68%
d. 100%

____ 21. The ages of participants in a bonspiel are normally distributed, with a mean of 40 and a standard deviation of 10 years. What percent of the curlers are between 20 and 30?

a. 17.5%
b. 13.5%
c. 27%
d. 32%

____ 22. A teacher is analyzing the class results for a physics test. The marks are normally distributed with a mean ($\mu$) of 76 and a standard deviation ($\sigma$) of 4.
Determine Olivia's mark if she scored $\mu - \sigma$.

a. 80
b. 72
c. 68
d. 84

____ 23. Determine the *z*-score for the given value.
$\mu = 120$, $\sigma = 10$, $x = 125$

a. –2
b. 0.5
c. –0.5
d. 2

____ 24. A poll was conducted about an upcoming election. The results are considered accurate within ±3.8 percent points, 9 times out of 10.
State the confidence level.

a. 99%
b. 95%
c. 19%
d. 90%

____ 25. A poll was conducted about an upcoming election. The result that 44% of people intend to vote for one of the candidates is considered accurate within ±2.7 percent points, 19 times out of 20.
State the confidence interval.

a. 41.3%–44%
b. 42.65%–45.35%
c. 44%–46.7%

d. 41.3%–46.7%

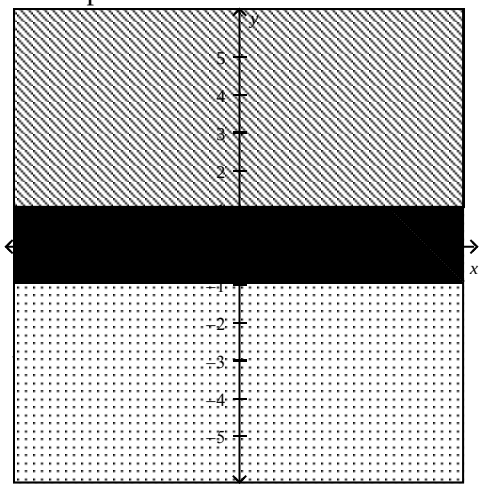
____ 26. For which inequality is (–5, 1) a possible solution?
a. $y > 9$
b. $y - 2x \geq 10$
c. $y \leq -9 + 2x$
d. $y < x - 2$

____ 27. How would you graph the solution set for the linear inequality $4y - 2x < 20$?
a. Draw a dashed boundary line $y = \frac{1}{2}x + 10$, then shade above the line.
b. Draw a dashed boundary line $y = \frac{1}{2}x + 10$, then shade below the line.
c. Draw a solid boundary line $y = \frac{1}{2}x + 10$, then shade below the line.
d. Draw a solid boundary line $y = \frac{1}{2}x + 10$, then shade above the line.

____ 28. A vending machine sells juice and pop.
• The machine holds, at most, 200 cans of drinks.
• Sales from the vending machine show that at least 3 cans of juice are sold for each can of pop.
• Each can of juice sells for \$1.50, and each can of pop sells for \$1.00.
Let $x$ represent the number of cans of pop.
Let $y$ represent the number of cans of juice.
How would you write the objective function for revenue, $R$?

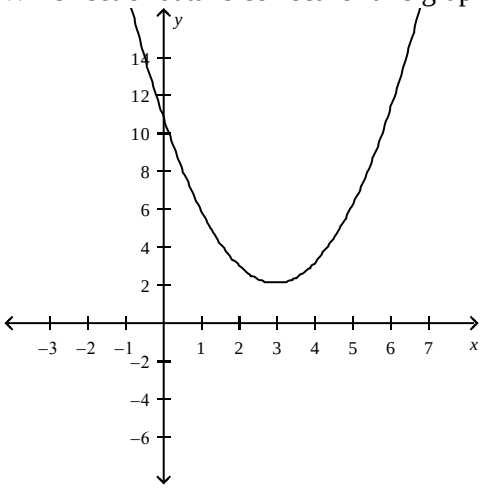
a. $R = x + 1.50y$
b. $R = 1.25x + y$
c. $R = 1.50(x + y)$
d. $R = 1.50y - x$

____ 29. Which point in the model below would result in the maximum value of the objective function $W = 5y - 10x$?




a. B (1, 4)
b. C (4, 1)
c. A (–2, 1)
d. D (1, 2)

____ 30. Which set of data is correct for this graph?



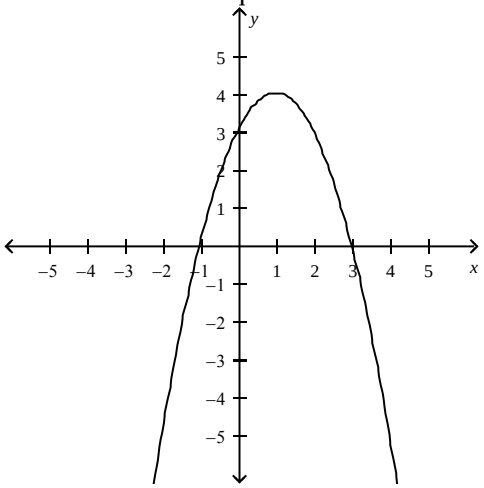

| | Axis of Symmetry | Vertex | Domain | Range |
|---|---|---|---|---|
| A. | $x = 3$ | (3, 2) | $x \in \mathrm{R}$ | $2 \le y$ |
| B. | $x = 3$ | (2, 3) | $x \in \mathrm{R}$ | $y \in \mathrm{R}$ |
| C. | $x = 2$ | (2, 3) | $-1 \le x \le 7$ | $2 \le y$ |
| D. | $x = 3$ | (3, 2) | $-2 \le x \le 8$ | $0 \le y$ |

a. Set A.
b. Set C.
c. Set D.
d. Set B.

____ 31. What are the $x$- and $y$-intercepts for the function $f(x) = x^2 - 2x + 3$?

a. no $x$-intercepts, $y = 3$
b. $x = 0$, $x = 3$, $y = 2$
c. $x = -1$, $x = 3$, $y = 3$
d. $x = -3$, $x = 1$, $y = 3$

____ 32. What is the correct quadratic function for this parabola?



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

____ 33. Solve $m^2 - 10m + 16 = 0$ by factoring.

a. $m = 4, m = 4$
b. $m = -8, m = -2$
c. $m = -4, m = -4$
d. $m = 8, m = 2$

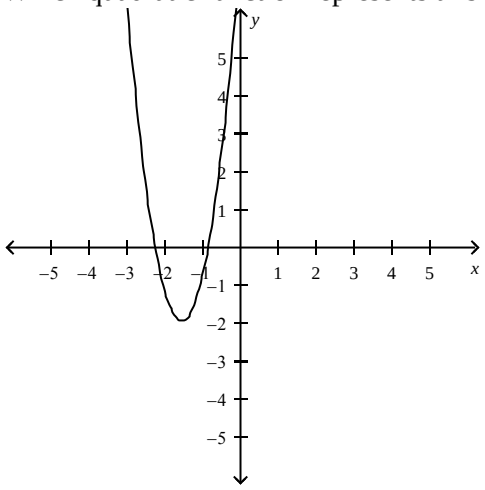
____ 34. Solve $6x^2 + 13x - 5 = 0$ by factoring.

a. $x = -2, x = 3$
b. $x = 2, x = -3$
c. $x = \frac{5}{2}, x = -\frac{1}{4}$
d. $x = -\frac{5}{2}, x = \frac{1}{3}$

____ 35. Solve $100n^2 = 121$ by factoring.

a. $x = 10, x = -11$
b. $x = \frac{11}{10}, x = -\frac{11}{10}$
c. $x = \frac{10}{11}, x = -\frac{10}{11}$
d. $x = 11, x = -11$

____ 36. Which quadratic function represents this parabola?

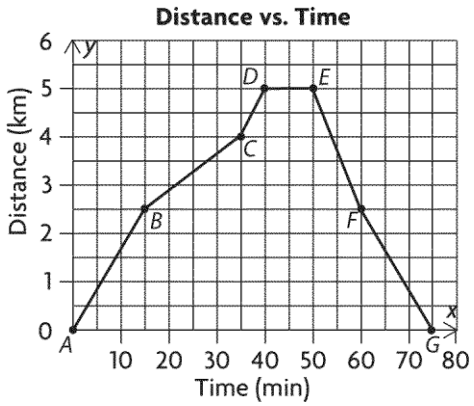



a. $f(x) = -4(x + 1.5)^2 + 2$
b. $f(x) = 4(x - 1.5)^2 - 2$
c. $f(x) = 4(x + 1.5)^2 - 2$
d. $f(x) = 4(x + 1.5)^2 + 2$

____ 37. A 2 L carton of milk costs $3.26. What is the unit rate?

a. $0.83/500 mL
b. **$3.27/2 L**
c. $0.61/L
d. $1.63/L

____ 38. The graph shows how a cyclist travels over time.
Over which interval is the cyclist travelling the slowest?




a. BC
b. DE
c. EF
d. FG

____ 39. A picture is 46 cm by 32 cm. A scale diagram of the picture must fit in a space that is 3 m by 2 m. Which scale would be the most reasonable one to use for the scale diagram?

a. 60%
b. 1 cm:60 cm
c. 6 cm:1 m
d. 1 cm:6 cm

____ 40. A photograph is 12 cm by 25 cm. A copy is made using a scale factor of 75%. What are the dimensions of the copy?

a. 9 cm by 19 cm
b. 90 cm by 19 cm
c. 9 mm by 19 cm
d. 9 m by 19 m

Short Answer

**41.** Try the following number trick with different numbers. Make a conjecture about the trick.

- Choose a number.
- Multiply by 3.
- Add 5.
- Multiply by 2.
- Subtract 10.
- Divide by 6.

42. What type of error occurs in the following deduction?
Briefly justify your answer.

All teens watch TV or play video games for more than seven hours each day. Julie is a teen. Therefore, Julie watches TV or plays video games for more than seven hours each day.

43. What type of error occurs in the following deduction?
Briefly justify your answer.

$$\begin{aligned} 3 &= 3 \\ 7(3) &= 7(2 + 1) \\ 7(3) + 6 &= 7(2 + 1) + 6 \\ 21 + 6 &= 14 + 7 \\ 27 &= 21 \end{aligned}$$

44. Determine the unknown term in this pattern.

1, 4, 16, 64, ___, 1024, 4096

45. Draw the next figure in this sequence.

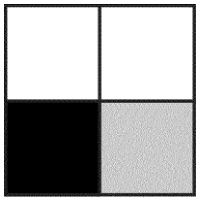


Figure 1

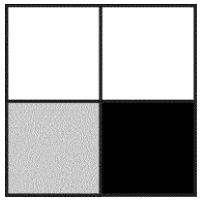


Figure 2

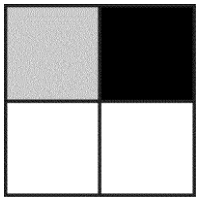
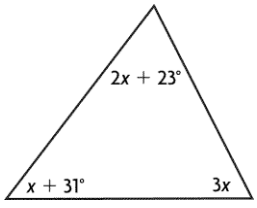


Figure 3

46. Determine the value of x.



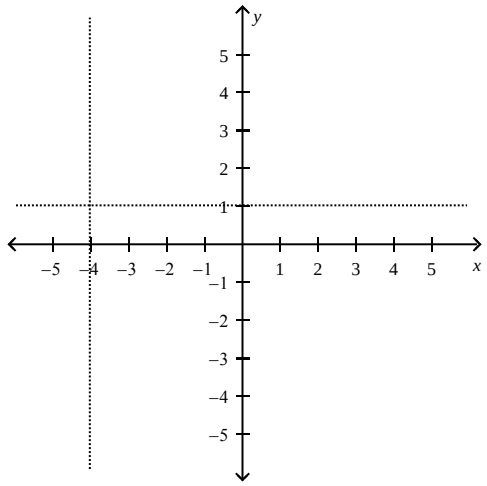
47. In DGHI, ÐG = 36°, $g$ = 20.4 cm, and ÐH = 72°.
Δετερμινε τηε λενγτη οφ σιδε $h$ to the nearest tenth of a centimetre.

48. Calculate sin 20° to four decimal places. Predict another angle that will have an equal or opposite trigonometric ratio.

49. In DABC, ÐA = 26°, $a$ = 8.5 cm, and $b$ = 5.0 cm. *Determine the number of triangles (zero, one, or two) that are possible for these measurements. Draw the triangle(s) to support your answer.*

50. Determine the percent of data between the following z-scores:
$z$ = –0.68 and $z$ = 1.74.

51. Complete the graph of the solution set for the following system of inequalities.
{(x, $y$) | $y < 1$, $x > -4$}




x, $y$) | $x \leq 4$, $\psi > x - 1$, $x \in$ R, $\psi \in$ R}

Fill in the table for the relation y = $x2 + 2^x + 11$.

| | |
|---|---|
| y-intercept | |
| **x**-intercept(s) | |
| **Axis of symmetry** | |
| **Vertex** | |
| **Domain** | |
| **Range** | |

54. Fill in the table for the relation y = $x2 - 1.5^{x+} 2$.

| | |
|---|---|
| Maximum or minimum | |
| **Axis of symmetry** | |
| **Vertex** | |

55. The graph of a quadratic function has x-intercepts –10 and 2. Write a quadratic equation that has these roots.

56. Solve $x^2 - 3x - 1 = 0$. State the solution as exact values.

57. A squirrel can run at 32.0 m in 6 s. A pig can run at 295 m in 1 min.
Determine the speed of each animal in metres per second.
Which animal can run faster?

Problem

**58.** A radio tower is supported by two wires on opposite sides. On the ground, the ends of the wire are 235 m apart. One wire makes a 75° angle with the ground. The other makes a 55° angle with the ground.

Draw a diagram of the situation. Then, determine the length of each wire to the nearest metre. Show your work.

59. The pendulum of a grandfather clock is 85.0 cm long. When the pendulum swings from one side to the other side, it travels a horizontal distance of 10.5 cm.
Determine the angle through which the pendulum swings. Round your answer to the nearest tenth of a degree.

60. A building is observed from two points, P and *Q*, that are 134.0 m apart. The angle of elevation is 35° at *P* and 27° at *Q*. Sketch the situation. Determine the height of the building to the nearest tenth of a metre.

61. A manufacturer offers a warranty on its vacuum cleaners. The vacuum cleaners have a mean lifespan of 3.4 years, with a standard deviation of 0.4 years. For how long should the vacuum cleaners be covered by the warranty, if the manufacturer wants to repair no more than 2.5% of the vacuum cleaners sold?

62. The staff in a cafeteria are making two kinds of sandwiches: chicken salad and liverwurst.
• A maximum of 600 sandwiches are needed.
• Based on previous demand, there should be at least four times as many chicken salad sandwiches as liverwurst sandwiches.
a) Define the variables and write a system of inequalities that models this situation.
**b)** Graph the system to determine the solution set.

63. A punter kicks a football 48 m to another player who catches it. The path of the football is defined by the function $h(x) = -\frac{1}{30}(x - 24)2 + 19.2$, where $^x$ is the horizontal distance, measured in metres, from the kicker.
*a)* Determine the axis of symmetry of the parabola.
**b)** What was the highest point of the football's path?
**c)** How high was the football from the ground when it was 6 m horizontally from the receiving player?
**d)** What is the range for this function? Justify your answer.

**Foundations 20 Practice Final**
**Answer Section**

1. **ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 1.1**
   **OBJ: 1.1: Make conjectures by observing patterns and identifying properties, and justify the reasoning.**
   **TOP: conjectures and Inductive Reasoning KEY: conjecture| inductive reasoning**
2. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 1.1
   OBJ: 1.1: Make conjectures by observing patterns and identifying properties, and justify the reasoning.
   TOP: conjectures and Inductive Reasoning KEY: conjecture| inductive reasoning
3. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 1.2
   OBJ: 1.2 Explain why inductive reasoning may lead to a false conjecture.
   TOP: Validity of conjectures KEY: conjecture| validity of conjectures
4. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 1.3
   OBJ: 1.4 Provide and explain a counterexample to disprove a given conjecture.
   TOP: Disproving conjectures: Counterexamples
   KEY: conjecture| disproving conjectures| counterexamples
5. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 1.4
   OBJ: 1.3 Compare, using examples, inductive and deductive reasoning.| 1.5 Prove algebraic and number relationships, such as divisibility rules, number properties, mental mathematics strategies or algebraic number tricks| 1.6 Prove a conjecture, using deductive reasoning (not limited to two column proofs).
   TOP: Proving conjectures| deductive reasoning
   KEY: conjecture| proving conjectures| reasoning| deductive reasoning
6. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 2.1
   OBJ: 1.1 Generalize, using inductive reasoning, the relationships between pairs of angles formed by transversals and parallel lines, with or without technology. | 1.5 Verify, with examples, that if lines are not parallel the angle properties do not apply. TOP: Parallel lines
   KEY: parallel lines| transversals
7. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 2.2
   OBJ: 1.2 Prove, using deductive reasoning, properties of angles formed by transversals and parallel lines, including the sum of the angles in a triangle. | 1.4 Identify and correct errors in a given proof of a property involving angles. | 2.1 Determine the measures of angles in a diagram that involves parallel lines, angles and triangles, and justify the reasoning. | 2.2 Identify and correct errors in a given solution to a problem that involves the measures of angles. | 2.3 Solve a contextual problem that involves angles or triangles. | 2.4 Construct parallel lines, using only a compass or a protractor, and explain the strategy used. | 2.5 Determine if lines are parallel, given the measure of an angle at each intersection formed by the lines and a transversal.
   TOP: Angles formed by parallel lines KEY: parallel lines| transversals| angles
8. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 2.2
   OBJ: 1.2 Prove, using deductive reasoning, properties of angles formed by transversals and parallel lines, including the sum of the angles in a triangle. | 1.4 Identify and correct errors in a given proof of a property involving angles. | 2.1 Determine the measures of angles in a diagram that involves parallel lines, angles and triangles, and justify the reasoning. | 2.2 Identify and correct errors in a given solution to a problem that involves the measures of angles. | 2.3 Solve a contextual problem that involves angles or triangles. | 2.4 Construct parallel lines, using only a compass or a protractor, and explain the strategy used. | 2.5 Determine if lines are parallel, given the measure of an angle at each intersection formed by the lines and a transversal.
   TOP: Angles formed by parallel lines KEY: parallel lines| transversals| angles
9. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 2.4
   OBJ: 1.3 Generalize, using inductive reasoning, a rule for the relationship between the sum of the interior

angles and the number of sides (n) in a polygon, with or without technology 1.4 Identify and correct errors in a given proof of a property involving angles.| 2.2 Identify and correct errors in a given solution to a problem that involves the measures of angles.| 2.3 Solve a contextual problem that involves angles or triangles.
TOP: Angle properties in polygons KEY: polygons| angle properties

10. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 3.1
OBJ: 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Side-angle relationships in acute triangles KEY: primary trigonometric ratios

11. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 3.2
OBJ: 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Proving and applying the sine law KEY: sine law

12. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 3.2
OBJ: 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Proving and applying the sine law KEY: sine law

13. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 3.4
OBJ: 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Solving problems using acute triangles
KEY: sine law| cosine law| primary trigonometric ratios

14. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 4.1
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or sine law.
TOP: Exploring the primary trigonometric ratios of obtuse angles
KEY: primary trigonometric ratios

15. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 4.2
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or sine law.
TOP: Proving and applying the sine and cosine laws for obtuse triangles
KEY: sine law | cosine law

16. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 4.3
OBJ: 3.4 Explain, concretely, pictorially or symbolically, whether zero, one or two triangles exist, given two sides and a non-included angle. TOP: The ambiguous case of the sine law
KEY: sine law | ambiguous case

17. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 5.2
TOP: Frequency tables, histograms, and frequency polygons
KEY: frequency distribution | histogram | frequency polygon

18. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 5.2
TOP: Frequency tables, histograms, and frequency polygons
KEY: frequency distribution | histogram | frequency polygon

19. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 5.3
OBJ: 1.3 Explain, using examples, the properties of a normal curve, including the mean, median, mode, standard deviation, symmetry and area under the curve. TOP: Standard deviation
KEY: mean | standard deviation

20. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 5.4
OBJ: 1.3 Explain, using examples, the properties of a normal curve, including the mean, median, mode, standard deviation, symmetry and area under the curve. TOP: The normal distribution
KEY: normal distribution | mean | standard deviation

21. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 5.4
OBJ: 1.7 Solve a contextual problem that involves the interpretation of standard deviation. | 1.9 Solve a contextual problem that involves normal distribution. TOP: The normal distribution
KEY: normal distribution | mean | standard deviation

22. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 5.4
OBJ: 1.7 Solve a contextual problem that involves the interpretation of standard deviation. | 1.9 Solve a contextual problem that involves normal distribution. TOP: The normal distribution

KEY: normal distribution | mean | standard deviation

23. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 5.5
OBJ: 1.8 Determine, with or without technology, and explain the z-score for a given value in a normally distributed data set. TOP: Applying the normal distribution: z-scores
KEY: z-score | standard normal distribution

24. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 5.6
OBJ: 2.1 Explain, using examples, how confidence levels, margin of error and confidence intervals may vary depending on the size of the random sample. | 2.2 Explain, using examples, the significance of a confidence interval, margin of error or confidence level. TOP: Confidence intervals
KEY: margin of error | confidence interval | confidence level

25. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 5.6
OBJ: 2.1 Explain, using examples, how confidence levels, margin of error and confidence intervals may vary depending on the size of the random sample. | 2.2 Explain, using examples, the significance of a confidence interval, margin of error or confidence level. TOP: Confidence intervals
KEY: margin of error | confidence interval | confidence level

26. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 6.1
OBJ: 1.3 Determine and explain the solution region that satisfies a linear inequality, using a test point when given a boundary line. TOP: Graphing linear inequalities in two variables
KEY: linear inequality | solution set

27. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 6.1
OBJ: 1.2 Graph the boundary line between two half planes for each inequality in a system of linear inequalities, and justify the choice of solid or dashed lines.
TOP: Graphing linear inequalities in two variables KEY: linear inequality | solution set

28. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 6.4
OBJ: 1.1 Model a problem, using a system of linear inequalities in two variables.
TOP: Optimization problems I: creating the model
KEY: optimization problem | objective function

29. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 6.5
OBJ: 1.4 Determine, graphically, the solution region for a system of linear inequalities, and verify the solution. TOP: Optimization problems II: exploring solutions
KEY: optimization problem | objective function

30. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 7.2
OBJ: 2.7 Determine, with or without technology, the coordinates of the vertex of the graph of a quadratic function. | 2.10 Determine the domain and range of a quadratic function.
TOP: Properties of graphs of quadratic functions
KEY: quadratic relation | vertex | axis of symmetry

31. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 7.2
OBJ: 2.1 Determine, with or without technology, the intercepts of the graph of a quadratic function. | 2.11 Sketch the graph of a quadratic function. TOP: Properties of graphs of quadratic functions
KEY: quadratic relation | axis of symmetry

32. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 7.4
OBJ: 2.6 Express a quadratic equation in factored form, given the zeros of the corresponding quadratic function or the x-intercepts of the graph of the function.
TOP: Factored form of a quadratic function KEY: quadratic relation | zero

33. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 7.5
OBJ: 2.2 Determine, by factoring, the roots of a quadratic equation, and verify by substitution.
TOP: Solving quadratic equations by factoring KEY: quadratic equation | roots

34. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 7.5
OBJ: 2.2 Determine, by factoring, the roots of a quadratic equation, and verify by substitution.
TOP: Solving quadratic equations by factoring KEY: quadratic equation | roots

35. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 7.5
OBJ: 2.2 Determine, by factoring, the roots of a quadratic equation, and verify by substitution.
TOP: Solving quadratic equations by factoring KEY: quadratic equation | roots

36. ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 7.6
OBJ: 2.6 Express a quadratic equation in factored form, given the zeros of the corresponding quadratic function or the x-intercepts of the graph of the function. | 2.9 Determine the coordinates of the vertex of the graph of a quadratic function, given the equation of the function and the axis of symmetry, and determine if the y-coordinate of the vertex is a maximum or a minimum. TOP: Vertex form of a quadratic function
KEY: quadratic relation | parabola | zero

37. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 8.1
OBJ: 1.1 Interpret rates in a given context, such as the arts, commerce, the environment, medicine or recreation. | 1.3 Determine and compare rates and unit rates. TOP: Comparing and interpreting rates
KEY: rate | unit rate

38. ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 8.1
OBJ: 1.1 Interpret rates in a given context, such as the arts, commerce, the environment, medicine or recreation. | 1.3 Determine and compare rates and unit rates. | 1.7 Explain, using examples, the relationship between the slope of a graph and a rate. TOP: Comparing and interpreting rates
KEY: rate

39. ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 8.3
OBJ: 2.2 Determine, using proportional reasoning, the scale factor, given one dimension of a 2-D shape or a 3-D object and its representation. TOP: Scale diagrams
KEY: scale | scale diagram

40. ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 8.3
OBJ: 2.3 Determine, using proportional reasoning, an unknown dimension of a 2-D shape or a 3-D object, given a scale diagram or a model. TOP: Scale diagrams
KEY: scale | scale factor

**41. ANS:**

PTS: 1 DIF: Grade 11 REF: Lesson 1.4
OBJ: 1.3 Compare, using examples, inductive and deductive reasoning.| 1.5 Prove algebraic and number relationships, such as divisibility rules, number properties, mental mathematics strategies or algebraic number tricks| 1.6 Prove a conjecture, using deductive reasoning (not limited to two column proofs).
TOP: Proving conjectures| deductive reasoning
KEY: conjecture| proving conjectures| reasoning| deductive reasoning

42. ANS:

PTS: 1 DIF: Grade 11 REF: Lesson 1.5
OBJ: 1.7 Determine if a given argument is valid, and justify the reasoning. | 1.8 Identify errors in a given proof; e.g., a proof that ends with 2 = 1. TOP: Invalid proofs| deductive reasoning
KEY: valid proofs| invalid proofs| deductive reasoning

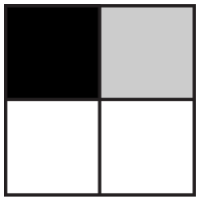
43. ANS:

PTS: 1 DIF: Grade 11 REF: Lesson 1.5
OBJ: 1.7 Determine if a given argument is valid, and justify the reasoning. | 1.8 Identify errors in a given proof; e.g., a proof that ends with 2 = 1. TOP: invalid proofs| deductive reasoning
KEY: valid proofs| invalid proofs| deductive reasoning

44. ANS:

PTS: 1 DIF: Grade 11 REF: Lesson 1.6
OBJ: 1.9 Solve a contextual problem involving inductive or deductive reasoning.
TOP: reasoning to solve problems KEY: reasoning| inductive reasoning| deductive reasoning

45. ANS:



PTS: 1 DIF: Grade 11 REF: Lesson 1.6
OBJ: 1.9 Solve a contextual problem involving inductive or deductive reasoning.
TOP: reasoning to solve problems KEY: reasoning| inductive reasoning| deductive reasoning

46. ANS:
= 21°

PTS: 1 DIF: Grade 11 REF: Lesson 2.3
OBJ: 1.2 Prove, using deductive reasoning, properties of angles formed by transversals and parallel lines, including the sum of the angles in a triangle.| 2.1 Determine the measures of angles in a diagram that involves parallel lines, angles and triangles, and justify the reasoning. TOP: Angles in triangles
KEY: angles| triangles

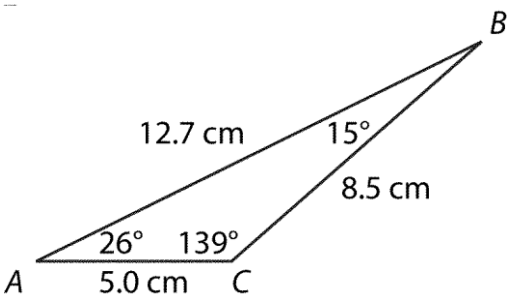
47. ANS:
33.0 cm

PTS: 1 DIF: Grade 11 REF: Lesson 3.2
OBJ: 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Proving and applying the sine law KEY: sine law

48. ANS:

PTS: 1 DIF: Grade 11 REF: Lesson 4.1
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or sine law.
TOP: Exploring the primary trigonometric ratios of obtuse angles
KEY: primary trigonometric ratios

49. ANS:

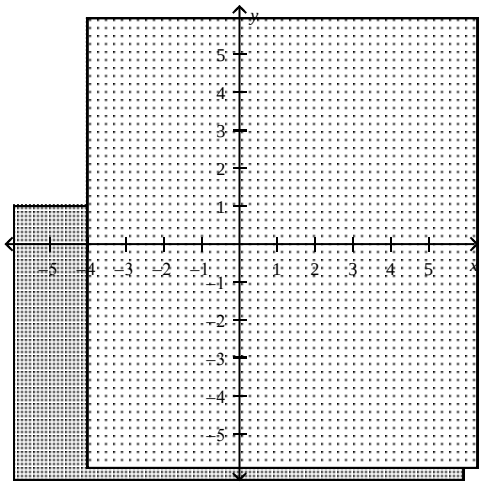



PTS: 1 DIF: Grade 11 REF: Lesson 4.3
OBJ: 3.4 Explain, concretely, pictorially or symbolically, whether zero, one or two triangles exist, given two sides and a non-included angle. TOP: The ambiguous case of the sine law
KEY: sine law | ambiguous case

50. ANS:
71.08%

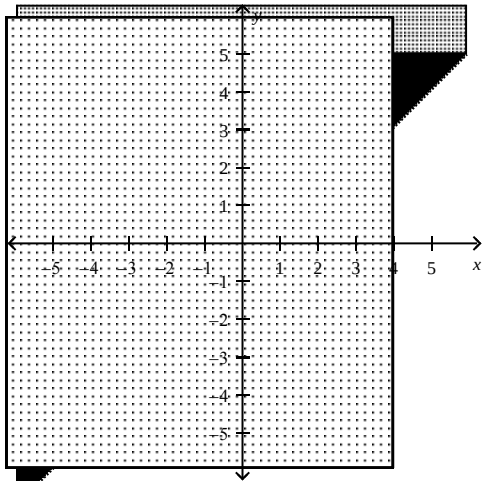
PTS: 1 DIF: Grade 11 REF: Lesson 5.5
OBJ: 1.8 Determine, with or without technology, and explain the z-score for a given value in a normally distributed data set. TOP: Applying the normal distribution: z-scores
KEY: z-score | standard normal distribution

51. ANS:




PTS: 1 DIF: Grade 11 REF: Lesson 6.3
OBJ: 1.3 Determine and explain the solution region that satisfies a linear inequality, using a test point when given a boundary line. | 1.4 Determine, graphically, the solution region for a system of linear inequalities, and verify the solution. | 1.5 Explain, using examples, the significance of the shaded region in the graphical solution of a system of linear inequalities. TOP: Graphing to solve systems of linear inequalities
KEY: systems of linear inequalities | solution set

52. ANS:




PTS: 1 DIF: Grade 11 REF: Lesson 6.3
OBJ: 1.2 Graph the boundary line between two half planes for each inequality in a system of linear inequalities, and justify the choice of solid or dashed lines. | 1.3 Determine and explain the solution region that satisfies a linear inequality, using a test point when given a boundary line. | 1.4 Determine, graphically, the solution region for a system of linear inequalities, and verify the solution. | 1.5 Explain, using examples, the significance of the shaded region in the graphical solution of a system of linear inequalities.
TOP: Graphing to solve systems of linear inequalities

KEY: systems of linear inequalities | solution set

53. ANS:

| | |
|---|---|
| y-intercept | ***(0, 11)*** |
| **x**-intercept(s) | ***none*** |
| **Axis of symmetry** | x = **–1** |
| *Vertex* | (–1, 10) |
| **Domain** | x Î R |
| Ρανγε | y ³ 10 |

PTS: 1 DIF: Grade 11 REF: Lesson 7.2
OBJ: 2.7 Determine, with or without technology, the coordinates of the vertex of the graph of a quadratic function. | 2.8 Determine the equation of the axis of symmetry of the graph of a quadratic function, given the x-intercepts of the graph. | 2.10 Determine the domain and range of a quadratic function.
TOP: Properties of graphs of quadratic functions
KEY: quadratic relation | vertex | axis of symmetry

54. ANS:

| | |
|---|---|
| Maximum or minimum | minimum |
| **Axis of symmetry** | x = **0.75** |
| *Vertex* | (0.75, 1.4375) |

PTS: 1 DIF: Grade 11 REF: Lesson 7.2
OBJ: 2.7 Determine, with or without technology, the coordinates of the vertex of the graph of a quadratic function. | 2.8 Determine the equation of the axis of symmetry of the graph of a quadratic function, given the x-intercepts of the graph. TOP: Properties of graphs of quadratic functions
KEY: quadratic relation | vertex | axis of symmetry | maximum value | minimum value

55. ANS:
Answers may vary.
$2 + 8^x - 20 = 0$

PTS: 1 DIF: Grade 11 REF: Lesson 7.5
OBJ: 2.2 Determine, by factoring, the roots of a quadratic equation, and verify by substitution. | 2.6 Express a quadratic equation in factored form, given the zeros of the corresponding quadratic function or the x-intercepts of the graph of the function. TOP: Solving quadratic equations by factoring
KEY: quadratic equation | roots

56. ANS:
$x = \frac{3 + \sqrt{13}}{2}\ x = \frac{3 - \sqrt{13}}{2}$

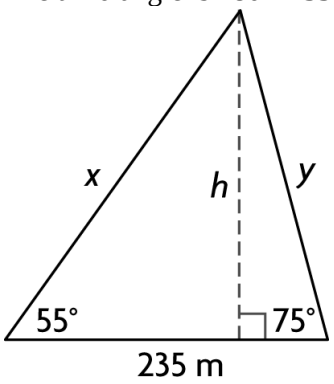
PTS: 1 DIF: Grade 11 REF: Lesson 7.7
OBJ: 2.3 Determine, using the quadratic formula, the roots of a quadratic equation.
TOP: Solving quadratic equations using the quadratic formula
KEY: quadratic equation | roots | quadratic formula

57. ANS:
Squirrel's speed: about 5.3 m/s
Pig's speed: about 4.9 m/s
The squirrel is faster.

PTS: 1 DIF: Grade 11 REF: Lesson 8.1
OBJ: 1.1 Interpret rates in a given context, such as the arts, commerce, the environment, medicine or recreation. | 1.3 Determine and compare rates and unit rates. TOP: Comparing and interpreting rates
KEY: rate | unit rate

**58. ANS:**

$x$ and $y$ be the length of the wires.
The third angle is 180° – 55° – 75° = 50°.




Use the sine law to determine the length of each wire:

$$\frac{x}{\sin 75°} = \frac{235}{\sin 50°} \qquad \frac{y}{\sin 55°} = \frac{235}{\sin 50°}$$

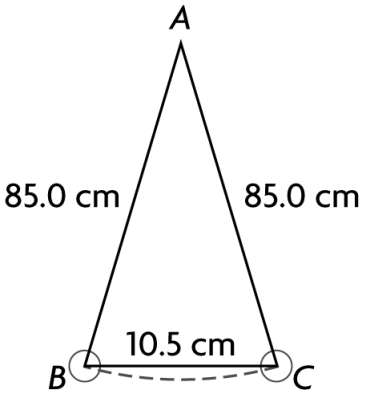
$$x = \frac{235 \sin 75°}{\sin 50°} \qquad y = \frac{235 \sin 55°}{\sin 50°}$$

$$x = 296.317... \qquad y = 251.291...$$

The wires are 296 m and 251 m long.

PTS: 1 DIF: Grade 11 REF: Lesson 3.2
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or the sine law. | 3.5 Solve a problem involving the sine law that requires the manipulation of a formula. | 3.6 Solve a contextual problem that involves the cosine law or sine law. TOP: Proving and applying the sine law
KEY: sine law| primary trigonometric ratios

59. ANS:




$$a^2 = b^2 + c^2 - 2bc \cos A$$
$$10.5^2 = 85.0^2 + 85.0^2 - 2(85.0)(85.0) \cos A$$
$$110.25 = 7225.00 + 7225.00 - 14\,450.00 \cos A$$

$$ñ14\,339.75 = ñ14\,450.00 \cos A$$

$$\frac{-14\,339.75}{-14\,450.00} = \cos A$$

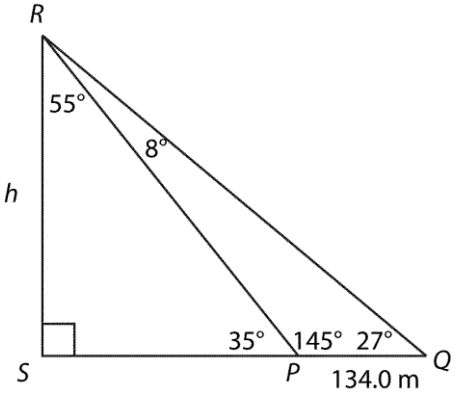
$$ÐA = \chi o \sigma^{-1}(0.9923...)$$

$$ÐA = 7.082...°$$

The pendulum swings through an angle of 7.1°.

PTS: 1 DIF: Grade 11 REF: Lesson 3.3
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or the sine law. | 3.3 Solve a problem involving the cosine law that requires the manipulation of a formula. | 3.6 Solve a contextual problem that involves the cosine law or sine law.
TOP: Proving and applying the cosine law KEY: cosine law

60. ANS:




ÐPRQ, *PQ*, and ÐPQR αρε κνοων. Υσε τηε σινε λαω το δετερμινε *PR*.

$$\frac{PR}{\sin PQR} = \frac{PQ}{\sin PRQ}$$

$$\frac{PR}{\sin 27°} = \frac{134.0}{\sin 8°}$$

$$\sin 27° \left(\frac{PR}{\sin 27°}\right) = \left(\frac{134.0}{\sin 8°}\right) \sin 27°$$

$$PR = 437.115...$$

The measures of ÐRSP, *PR*, and ÐSPR αρε κνοων. Υσε τηε σινε λαω το δετερμινε *RS*, or *h*, the height of the building.

$$\frac{RS}{\sin SPR} = \frac{PR}{\sin RSP}$$

$$\frac{RS}{\sin 35°} = \frac{437.1}{\sin 90°}$$

$$\sin 35° \left(\frac{RS}{\sin 35°}\right) = \left(\frac{437.1}{\sin 90°}\right) \sin 35°$$

$$RS = 250.710...$$

The height of the building is 350.7 m.

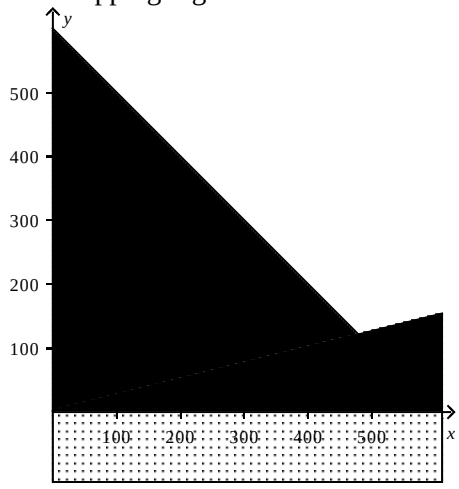
PTS: 1 DIF: Grade 11 REF: Lesson 4.2
OBJ: 3.1 Draw a diagram to represent a problem that involves the cosine law or sine law. | 3.3 Solve a problem

involving the cosine law that requires the manipulation of a formula. | 3.5 Solve a problem involving the sine law that requires the manipulation of a formula.
TOP: Proving and applying the sine and cosine laws for obtuse triangles
KEY: sine law

61. ANS:
Since 2.5% of the vacuum cleaners should have a lifespan less than two standard deviations below the mean, the manufacturer should set that time as the warranty.
3.4 – 2(0.4) = 2.6
The warranty period should be less than 2.6 years.

PTS: 1 DIF: Grade 11 REF: Lesson 5.4
OBJ: 1.3 Explain, using examples, the properties of a normal curve, including the mean, median, mode, standard deviation, symmetry and area under the curve. | 1.6 Explain, using examples that represent multiple perspectives, the application of standard deviation for making decisions in situations such as warranties, insurance or opinion polls. TOP: The normal distribution
KEY: normal distribution | mean | standard deviation

62. ANS:
Let **x** represent the number of chicken salad sandwiches.
Let *y* represent the number of liverwurst sandwiches.
$\{(x, y) \mid x + y \leq 600, \xi \hat{I} W, \psi \hat{I} W\}$
$\{(\xi, y) \mid x \geq 4\psi, x \hat{I} W, \psi \hat{I} W\}$
β) Graph the solid line **x** + *y* = 600 and shade the region for $x + y \leq 600$.
Graph the solid line for $4\psi = x$ and shade the region for $4y \leq \xi$. All the points with whole number coordinates in the overlapping region and on the boundaries are the solution set.




PTS: 1 DIF: Grade 11 REF: Lesson 6.3
OBJ: 1.2 Graph the boundary line between two half planes for each inequality in a system of linear inequalities, and justify the choice of solid or dashed lines. | 1.3 Determine and explain the solution region that satisfies a linear inequality, using a test point when given a boundary line. | 1.4 Determine, graphically, the solution region for a system of linear inequalities, and verify the solution. | 1.5 Explain, using examples, the significance of the shaded region in the graphical solution of a system of linear inequalities.
TOP: Graphing to solve systems of linear inequalities
KEY: systems of linear inequalities | solution set

63. ANS:
The vertex is (24, 19.2), so the axis of symmetry is **x** = 24.
*b)* The vertex is (24, 19.2), so the highest point of the football's path is 19.2 m.

**c)** Substitute 48 – 6 = 42 for **x** in the equation and solve for *h*(42).

$h(42) = -\frac{1}{30}(42 - 24)2 + 19.2$

$^{h}(42) = -\frac{1}{30}(324) + 19.2$

$h(42) = 8.4$

The football is 8.4 m from the ground.

*d)* 0 **£** ξ £ 48; the ball is kicked 48 m, then caught.

PTS: 1 DIF: Grade 11 REF: Lesson 7.6
OBJ: 2.7 Determine, with or without technology, the coordinates of the vertex of the graph of a quadratic function. | 2.9 Determine the coordinates of the vertex of the graph of a quadratic function, given the equation of the function and the axis of symmetry, and determine if the y-coordinate of the vertex is a maximum or a minimum. | 2.10 Determine the domain and range of a quadratic function.
TOP: Vertex form of a quadratic function
KEY: quadratic relation | parabola | vertex | axis of symmetry | maximum value