**So Ya Think Ya Can Math?**

**Multiple Choice**

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

**\_\_\_\_ 1.** Determine the degree of this polynomial function:



|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 2.** Determine the number of turning points on this polynomial function:



|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 3.** Determine the number of turning points on this polynomial function:



|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 4.** Determine the degree of this polynomial function:

*f*(*x*) =  + 2*x*

|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 5.** Determine the degree of this polynomial function:

*f*(*x*) = 4*x* – 23 + *x*

|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 6.** Determine the leading coefficient of this polynomial function:

*f*(*x*) = *x*2(*x* – 2*x* + 10)

|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | –1 |
| **D.** | –2 |

**\_\_\_\_ 7.** Determine the number of turning points of this polynomial function:

*f*(*x*) = *x*2 – 5*x* – 1

|  |  |
| --- | --- |
| **A.** | 0 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 8.** Determine the equation of this polynomial function:



|  |  |
| --- | --- |
| **A.** | *f*(*x*) = –*x*2 – 3*x* – 1 |
| **B.** | *g*(*x*) = *x*2 – 2*x* + 1 |
| **C.** | *h*(*x*) = –*x*3 – 2*x*2 + 1 |
| **D.** | *j*(*x*) = *x*3 + 2*x* |

**\_\_\_\_ 9.** Determine the equation of this polynomial function:



|  |  |
| --- | --- |
| **A.** | *f*(*x*) = –*x*2 – 3*x* – 1 |
| **B.** | *g*(*x*) = *x*2 – 2*x* + 1 |
| **C.** | *h*(*x*) = –*x*3 – 2*x*2 + 1 |
| **D.** | *j*(*x*) = *x*3 + 2*x* |

**\_\_\_\_ 10.** Fill in the blanks to describe the end behaviour of this polynomial function:

The curve extends from quadrant \_\_\_\_ to quadrant \_\_\_\_.



|  |  |
| --- | --- |
| **A.** | II; I |
| **B.** | II; IV |
| **C.** | III; I |
| **D.** | III; IV |

**\_\_\_\_ 11.** The distance a marathon runner covers can be modelled by the function

*d*(*t*) = 153.8*t* + 86

where *d* represents the distance in metres and *t* represents the time in minutes.

Approximately how far has she run after the first hour?

|  |  |
| --- | --- |
| **A.** | 93 km |
| **B.** | 3 km |
| **C.** | 14 km |
| **D.** | 9 km |

**\_\_\_\_ 12.** The growth of a tree can be modelled by the function

*h*(*t*) = 2.3*t* – 0.45

where *h* represents the height in metres and *t* represents the time in years.

Approximately how long will it take the tree to grow 32 m tall?

|  |  |
| --- | --- |
| **A.** | 13 years |
| **B.** | 14 years |
| **C.** | 15 years |
| **D.** | 16 years |

**\_\_\_\_ 13.** Use a ruler to help you estimate the slope for a line that best approximates the data in the scatter plot.



|  |  |
| --- | --- |
| **A.** | –1 |
| **B.** | 1 |
| **C.** | 2 |
| **D.** | 3 |

**\_\_\_\_ 14.** Use a ruler to help you estimate the *y*-intercept for a line that best approximates the data in the scatter plot.



|  |  |
| --- | --- |
| **A.** | –10 |
| **B.** | 10 |
| **C.** | 30 |
| **D.** | 50 |

**\_\_\_\_ 15.** Use a ruler to help you estimate the *y*-intercept for a line that best approximates the data in the scatter plot.



|  |  |
| --- | --- |
| **A.** | 12 |
| **B.** | 16 |
| **C.** | 20 |
| **D.** | 0 |

**\_\_\_\_ 16.** Determine the equation of the linear regression function for the data.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *x* | 1 | 2 | 3 | 4 | 5 | 6 |
| *y* | 84 | 155 | 241 | 310 | 405 | 478 |

|  |  |
| --- | --- |
| **A.** | *y* = 79.7*x* – 0.07 |
| **B.** | *y* = 78.1*x* – 1.07 |
| **C.** | *y* = 79.7*x* + 0.07 |
| **D.** | *y* = 78.1*x* + 1.07 |

**\_\_\_\_ 17.** The path of a shot put thrown at a track and field meet is modelled by the quadratic function

*h*(*d*) = –0.048(*d*2 – 20.7*d* – 26.28)

where *h* is the height in metres and *d* is the horizontal distance in metres.

Determine the height of the discus when it has travelled 10 m horizontally.

|  |  |
| --- | --- |
| **A.** | 6.2 m |
| **B.** | 6.4 m |
| **C.** | 6.6 m |
| **D.** | 6.8 m |

**\_\_\_\_ 18.** Determine the equation of the quadratic regression function for the data.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | 1 | 2 | 3 | 4 | 5 |
| *y* | 100.8 | 101.3 | 101.5 | 100.9 | 99.8 |

|  |  |
| --- | --- |
| **A.** | *y = –*0.3*x*2 + 1.5*x* + 99.6 |
| **B.** | *y = –*1.3*x*2 + 0.5*x* + 99.6 |
| **C.** | *y = –*0.5*x*2 + 1.3*x* + 99.6 |
| **D.** | *y = –*1.5*x*2 + 0.3*x* + 99.6 |

**\_\_\_\_ 19.** Determine the equation of the cubic regression function for the data.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 2 | 4 | 7 | 10 | 12 | 13 | 17 | 19 |
| *y* | 135 | 120 | 105 | 102 | 99 | 88 | 78 | 47 |

|  |  |
| --- | --- |
| **A.** | *y =* 0.05*x*3 – 1.5*x*2 – 16*x* + 162.5 |
| **B.** | *y = –*0.05*x*3 + 1.5*x*2 – 16*x* + 162.5 |
| **C.** | *y =* 0.05*x*3 + 1.5*x*2 + 16*x* – 162.5 |
| **D.** | *y = –*0.05*x*3 + 1.5*x*2 + 16*x* – 162.5 |

**\_\_\_\_ 20.** Determine the equation of the cubic regression function for the data.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 2 | 3 | 3 | 6 | 8 | 11 | 12 | 12 |
| *y* | 18.5 | 26.7 | 31.3 | 32.8 | 41.5 | 45.0 | 48.3 | 47.6 | 49.1 |

|  |  |
| --- | --- |
| **A.** | *y =* 1.4*x*3 + 0.2*x*2 – 5.1*x* + 18.3 |
| **B.** | *y = –*1.4*x*3 + 0.2*x*2 + 5.1*x* + 18.3 |
| **C.** | *y =* 1.4*x*3 – 0.2*x*2 – 5.1*x* + 18.3 |
| **D.** | *y = –*1.4*x*3 – 0.2*x*2 + 5.1*x* + 18.3 |

**Short Answer**

**1.** What is the degree of a linear function?

**2.** Determine the degree of this polynomial function:



**3.** Determine the degree of this polynomial function:

*f*(*x*) = *x*2 – 5*x* + 1

**4.** Determine the degree of this polynomial function:

*f*(*x*) = 104 – *x*2 + *x*

**5.** Determine the leading coefficient of this polynomial function:

*f*(*x*) = *x*2 – 5*x* + 1

**6.** Determine the leading coefficient of this polynomial function:

*f*(*x*) = 104 – *x*2 + *x*

**7.** Determine the leading coefficient of this polynomial function:

*f*(*x*) = 10*x*3(5*x* – 2*x*2 + 3)

**8.** How many turning points does a degree 1 polynomial function have?

**9.** Describe the end behaviour of this polynomial function:

*f*(*x*) = –5*x*2 + *x* – 2

**10.** The volume of water in a cylindrical water tank being drained can be modelled by the function

*v*(*t*) = –3.8*t* + 225

where *v* represents the volume in litres and *t* represents the time in minutes.

How much water is left in the tank after half an hour?

**11.** The distance a marathon runner covers can be modelled by the function

*d*(*t*) = 153.8*t* + 86

where *d* represents the distance in metres and *t* represents the time in minutes.

Does this mean that she has already run 86 m when *t* = 0?

**12.** Determine the independent and dependent variables for the following relationship:

The speed of vehicles is related to the distance travelled in an hour.

**13.** Describe the characteristics of the trend in the data.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *y* | –40 | –36 | –46 | –46 | –55 | –57 | –50 | –61 |

**14.** Use a ruler to help you estimate the *y*-intercept for a line that best approximates the data in the scatter plot.



**15.** Use a ruler to help you estimate the slope for a line that best approximates the data in the scatter plot.



**16.** Determine the equation of the linear regression function for the data. Round all values to the nearest tenth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | –2.5 | –2.0 | –1.5 | –1.0 | –0.5 | 0 | 0.5 |
| *y* | 165 | 188 | 204 | 213 | 250 | 284 | 304 |

**17.** Determine the independent and dependent variables for the following relationship:

The latitude of a weather station is related to the mean temperature for April.

**18.** Determine the equation of the cubic regression function for the data. Round all values to the nearest hundredth.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| *y* | 5 | 12 | 16 | 16 | 15 | 18 | 25 | 35 | 58 |

**19.** Use quadratic regression to interpolate the value of *y* when *x* = 0. Round your answer to the nearest tenth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | –5 | –3 | –2 | 1 | 3 | 4 | 7 |
| *y* | 1.8 | 1.1 | 0.9 | 1.5 | 2.5 | 3.8 | 8.6 |

**20.** Use cubic regression to extrapolate the value of *y* when *x* = 50. Round your answer to the nearest whole number.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
| *y* | 211 | 236 | 255 | 258 | 264 | 267 | 276 | 291 |

**Problem**

**1.** Determine the following characteristics of the polynomial function *f*(*x*) = *x*3 – 8*x*2 – 3.

Show your work.

• number of possible *x*-intercepts

• *y*-intercept

• end behaviour

• domain

• range

• number of possible turning points

**2.** Determine the following characteristics of the polynomial function *f*(*x*) = –5(3 – 2*x*)(*x* + 1).

Show your work.

• number of possible *x*-intercepts

• *y*-intercept

• end behaviour

• domain

• range

• number of possible turning points

**3.** Determine the following characteristics of the polynomial function *f*(*x*) = –5(*x* – 1)(*x*2 + 4).

Show your work.

• number of possible *x*-intercepts

• *y*-intercept

• end behaviour

• domain

• range

• number of possible turning points

**4.** Identify the correct polynomial function for this graph. Justify your reasoning.



|  |  |
| --- | --- |
| **i)**  *y* = –*x* + 1 | **iv)**  *y* = – – *x* |
| **ii)**  *y* = –*x*2 + *x* + 4 | **v)**  *y* = 2(*x* – 2)(*x* – 1) |
| **iii)**  *y* = | **vi)**  *y* = (*x*3 + *x* + 1) |

**5.** Identify the correct polynomial function for this graph. Justify your reasoning.



|  |  |
| --- | --- |
| **i)**  *y* = –*x* + 1 | **iv)**  *y* = – – *x* |
| **ii)**  *y* = –*x*2 + *x* + 4 | **v)**  *y* = 2(*x* – 2)(*x* – 1) |
| **iii)**  *y* = | **vi)**  *y* = (*x*3 + *x* + 1) |

**6.** Identify the correct polynomial function for this graph. Justify your reasoning.



|  |  |
| --- | --- |
| **i)**  *y* = –*x* + 1 | **iv)**  *y* = – – *x* |
| **ii)**  *y* = –*x*2 + *x* + 4 | **v)**  *y* = 2(*x* – 2)(*x* – 1) |
| **iii)**  *y* = | **vi)**  *y* = (*x*3 + *x* + 1) |

**7.** Write an equation for a polynomial function that satisfies each set of characteristics. Explain your reasoning.

**a)** degree 1, decreasing function, *y*-intercept of –2

**b)** one turning point, a maximum value, *y*-intercept of 3

**8.** A hockey coach want to know the relationship between the number of shots his team takes during a game and the number of goals they score. She collected the following data from the last few games.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Shots** | 11 | 20 | 24 | 28 | 27 | 33 | 17 | 38 |
| **Goals** | 1 | 2 | 0 | 3 | 2 | 3 | 1 | 4 |

**a)** Create a scatter plot, and draw a line of best fit for the data.

**b)** Use your graph to estimate the number of shots required to score 3 goals.

**9.** A soccer coach want to know the relationship between the number of shots his team takes during a game and the number of goals they score. He collected the following data from the last few games.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Shots** | 18 | 14 | 8 | 21 | 15 | 10 | 25 | 18 |
| **Goals** | 2 | 1 | 0 | 3 | 2 | 0 | 4 | 3 |

**a)** Create a scatter plot, and draw a line of best fit for the data.

**b)** Use your graph to estimate the number of shots required to score 2 goals.

**10.** A college kept track of the attendance at varsity football home games in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Game** | 1 | 2 | 3 | 4 | 6 | 7 |
| **Attendance** | 1230 | 1310 | 1405 | 1645 | 1865 | 2180 |

**a)** Create a scatter plot, and draw a line of best fit for the data.

**b)** Use your graph to interpolate the attendance at the fifth game.

**11.** A college kept track of the attendance at varsity football home games in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Game** | 1 | 2 | 3 | 4 | 5 | 6 |
| **Attendance** | 1178 | 986 | 587 | 634 | 552 | 412 |

**a)** Create a scatter plot, and draw a line of best fit for the data.

**b)** Use your graph to estimate the attendance at the seventh game.

**12.** A statistician determined that the winning times in the women’s 200 m Olympic sprint can be modelled by the regression equation

*T* = 22.249 – 0.034*y*

where *T* represent the winning time in seconds and *y* represents the years since 1992.

**a)** What do the slope and *y*-intercept represent in this context?

**b)** Estimate the first year when the winning time will be below 21 s. Remember that the summer Olympics occurs every four years.

**13.** A bed-and-mattress retailer is planning to open another store. The location that is being considered has 1650 sq ft of floor space. The retailer needs to know the number of display beds they could have on the floor. Use the data from the retailer’s other locations to extrapolate the number of beds they can display. Show your work.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Number of Beds** | 24 | 9 | 12 | 16 | 30 | 15 |
| **Floor Space (sq ft)** | 1250 | 700 | 840 | 1000 | 1420 | 1100 |

**14.** A bed-and-mattress retailer is planning to open another store. The location that is being considered has 900 sq ft of floor space. The retailer needs to know the number of display beds they could have on the floor. Use the data from the retailer’s other locations to interpolate the number of beds they can display. Show your work.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Number of Beds** | 22 | 9 | 6 | 20 | 25 | 18 |
| **Floor Space (sq ft)** | 1200 | 700 | 600 | 1100 | 1300 | 1150 |

**15.** Meghan screen prints T-shirts for sale at concerts. When buying blank T-shirts, the price Meghan must pay is related to the size of the order. Four of her previous orders are listed in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Shirts** | 150 | 320 | 360 | 450 |
| **Cost per Shirt ($)** | 15.85 | 15.00 | 14.80 | 14.35 |

Meghan has misplaced the information from her supplier about prices on bulk orders. She would like to get the price per shirt below $12.50 on her next order. Extrapolate the number of T-shirts she should order. Show your work.

**16.** Aisha screen prints T-shirts for sale at concerts. When buying blank T-shirts, the price Aisha must pay is related to the size of the order. Four of her previous orders are listed in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Shirts** | 225 | 310 | 400 | 750 |
| **Cost per Shirt ($)** | 14.90 | 14.56 | 14.20 | 12.80 |

Aisha has misplaced the information from her supplier about prices on bulk orders. Interpolate the price per shirt if she orders 625 shirts. Show your work.

**17.** Ida hit a golf ball from the top of a hill. The height of the ball above the green can be modelled by the regression equation

*h*(*t*) = –9.7*t*2 + 48.4*t* + 11.5

where *h* represent the height in metres and *y* represents the time in seconds.

**a)** Use your knowledge of polynomial functions to describe the curve of this function.

**b)** Determine the *y*-intercept. What does it represent in this context? Show your work.

**c)** The roots of this equation are near *t* = –0.2 and *t* = 5.2. What do these points represent, if anything?

**18.** A research company summarized the average time spent everyday by teenagers watching television.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| **Time (min)** | 179 | 195 | 196 | 190 | 187 | 185 | 182 | 169 |

**a)** Create a scatter plot, and draw a curve of best fit for the data using quadratic regression.

**b)** Use your graph to estimate the average amount of time spent watching television in 2008.

**19.** A farming cooperative collected data showing the effect of different amounts of fertilizer, *x*, in hundreds of kilograms per hectare (kg/ha), on the yield of beets, *y*, in tonnes (t). Use the data below and quadratic regression to compare the possible yields of beets when the amount of fertilizer used is 1.50 kg/ha and 1.75 kg/ha. Show your work.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fertilizer**  **(kg/ha)** | 0 | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 |
| **Yield (t)** | 0.22 | 0.49 | 0.74 | 0.92 | 1.05 | 1.15 |

**20.** Shane tracked the depth of the water at an ocean marina one afternoon. His data is summarized in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Time of Day** | 12:00 | 13:00 | 14:00 | 15:00 | 16:00 | 18:00 | 19:00 |
| **Depth (ft)** | 12.3 | 12.7 | 13.3 | 13.8 | 14.3 | 14.6 | 14.3 |

**a)** Determine the equation for the cubic regression function that models this data. Let *x* be the number of hours since 12:00 and *y* be the depth in feet.

**b)** Interpolate the depth of the water at 17:00. Show your work.

**c)** Extrapolate the depth of the water at 10:30 that morning. Show your work.

**Math 12 Practice Q's**

**Answer Section**

**MULTIPLE CHOICE**

**1.** ANS: D PTS: 1 DIF: Grade 12 REF: Lesson 6.1

OBJ: 1.1 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their graphs. TOP: Exploring the graphs of polynomial functions

KEY: polynomial functions

**2.** ANS: A PTS: 1 DIF: Grade 12 REF: Lesson 6.1

OBJ: 1.1 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their graphs. TOP: Exploring the graphs of polynomial functions

KEY: polynomial functions | turning point

**3.** ANS: C PTS: 1 DIF: Grade 12 REF: Lesson 6.1

OBJ: 1.1 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their graphs. TOP: Exploring the graphs of polynomial functions

KEY: polynomial functions | turning point

**4.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**5.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**6.** ANS: C PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | leading coefficient

**7.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | leading coefficient

**8.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**9.** ANS: D PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**10.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour

**11.** ANS: D PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**12.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**13.** ANS: C PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**14.** ANS: C PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**15.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**16.** ANS: A PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | regression function

**17.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | curve of best fit

**18.** ANS: A PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function

**19.** ANS: B PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function

**20.** ANS: D PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function

**SHORT ANSWER**

**1.** ANS:

1

PTS: 1 DIF: Grade 12 REF: Lesson 6.1

OBJ: 1.1 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their graphs. TOP: Exploring the graphs of polynomial functions

KEY: polynomial functions

**2.** ANS:

0

PTS: 1 DIF: Grade 12 REF: Lesson 6.1

OBJ: 1.1 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their graphs. TOP: Exploring the graphs of polynomial functions

KEY: polynomial functions

**3.** ANS:

2

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**4.** ANS:

2

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions KEY: polynomial functions

**5.** ANS:



PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | leading coefficient

**6.** ANS:

–1

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | leading coefficient

**7.** ANS:

–20

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | leading coefficient

**8.** ANS:

0

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | turning point

**9.** ANS:

The curve extends from quadrant III to quadrant IV.

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour

**10.** ANS:

111 L

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**11.** ANS:

No. The function is a line of best fit, so it is not exact.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**12.** ANS:

Independent: speed of vehicles

Dependent: distance travelled in an hour

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit KEY: polynomial functions

**13.** ANS:

decreasing

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**14.** ANS:

40

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**15.** ANS:

–2.5

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**16.** ANS:

*y* = 46.8*x* – 276.5

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | line of best fit

**17.** ANS:

Independent: latitude of a weather station

Dependent: mean temperature for April

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit KEY: polynomial functions

**18.** ANS:

*y =* 0.38*x*3 – 3.55*x*2 + 10.93*x* + 4.81

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | curve of best fit

**19.** ANS:

0.9

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | curve of best fit | interpolate

**20.** ANS:

363

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | curve of best fit | extrapolate

**PROBLEM**

**1.** ANS:

This is a cubic function. The degree is 3.

Therefore, there are either 1, 2, or 3 possible *x*-intercepts.

Also, the domain and range of a cubic function are all real numbers:

Domain: {*x* | *x*  R}

Range: {*y* | *y*  R}

A cubic function has either 0 or 2 turning points.

The constant term is –3, so the *y*-intercept is –3.

The leading coefficient is positive.

Therefore, the curve extends from quadrant III to quadrant I.

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient | turning point

**2.** ANS:

In standard form, this function is *f*(*x*) = 10*x*2 – 5*x* – 15.

This is a quadratic function. The degree is 2.

Therefore, there are either 0, 1, or 2 possible *x*-intercepts.

A quadratic function has either 0 or 2 turning points.

The constant term is –15, so the *y*-intercept is –15.

The leading coefficient is positive.

Therefore, the curve extends from quadrant II to quadrant I.

The domain of a quadratic function is all real numbers:

Domain: {*x* | *x*  R}

I can’t determine the range without knowing the vertex, but I know the parabola opens up. Therefore, the range is restricted to all values greater than or equal to the maximum:

Range: {*y* | *y*  maximum, *y*  R}

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient | turning point

**3.** ANS:

In standard form, this function is *f*(*x*) = –5*x*3 + 5*x*2 – 20*x* + 20.

This is a cubic function. The degree is 3.

Therefore, there are either 1, 2, or 3 possible *x*-intercepts.

Also, the domain and range of a cubic function are all real numbers:

Domain: {*x* | *x*  R}

Range: {*y* | *y*  R}

A cubic function has either 0 or 2 turning points.

The constant term is 20, so the *y*-intercept is 20.

The leading coefficient is negative.

Therefore, the curve extends from quadrant II to quadrant IV.

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient | turning point

**4.** ANS:

This is a parabola, so the function must be quadratic.

Both ii) and v) have the same constant term as the *y* intercept, 4, but different leading coefficients.

The parabola opens up, so the leading coefficient must be positive.

Therefore, the graph matches function v).

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient | turning point

**5.** ANS:

This is a linear function with degree 1.

Both i) and iv) have negative leading coefficients, but different constant terms.

The *y*-intercept is 1, so the constant term of the correct function must be 1.

Therefore, the graph matches function i).

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient

**6.** ANS:

This is a cubic function with degree 3.

Both iii) and vi) have positive leading coefficients, but different constant terms.

The *y*-intercept is 0, so the constant term of the correct function must be 0.

Therefore, the graph matches function iii).

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

KEY: polynomial functions | end behaviour | leading coefficient | turning point

**7.** ANS:

**a)** The degree is 1, so this is a linear function.

The function is decreasing, so the leading coefficient must be negative.

The *y*-intercept is –2, so the constant term must be –2.

Sample function: *f*(*x*) = –*x* – 2

**b)** The there is one turning point which is a maximum, therefore, the polynomial function must be a parabola that opens down.

The leading coefficient must be negative.

The *y*-intercept is 3, so the constant term must be 3.

Sample function: *f*(*x*) = –*x*2 + 3

PTS: 1 DIF: Grade 12 REF: Lesson 6.2

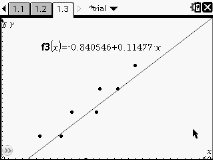
OBJ: 1.2 Describe, orally and in written form, the characteristics of polynomial functions by analyzing their equations. | 1.3 Match equations in a given set to their corresponding graphs.

TOP: Characteristics of the equations of polynomial functions

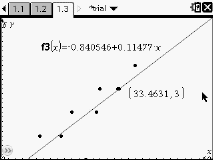
KEY: polynomial functions | leading coefficient | turning point

**8.** ANS:

**a)**



**b)**



Using the line of best fit, the team should take about 33 shots to score 3 goals.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

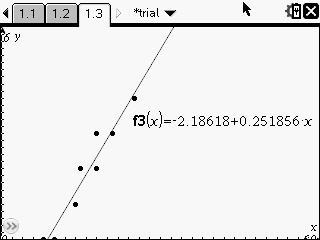
OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

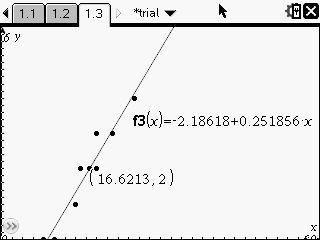
KEY: polynomial functions | line of best fit | regression function

**9.** ANS:

**a)**



**b)**



Using the line of best fit, the team should take about 17 shots to score 2 goals.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

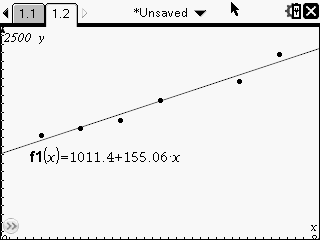
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TOP: Modelling data with a line of of best fit

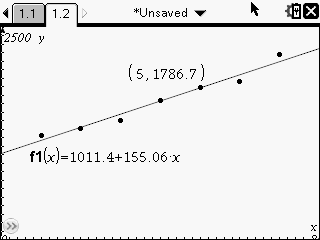
KEY: polynomial functions | line of best fit | regression function

**10.** ANS:

**a)**



**b)**



Using the line of best fit, the attendance should have been about 1787 people.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

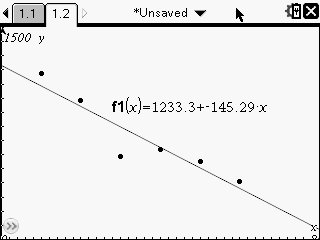
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TOP: Modelling data with a line of of best fit

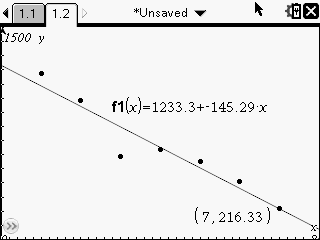
KEY: polynomial functions | line of best fit | regression function | interpolate

**11.** ANS:

**a)**



**b)**



Using the line of best fit, the attendance should be about 216 people.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

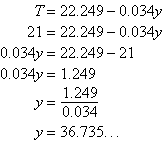
KEY: polynomial functions | line of best fit | regression function | extrapolate

**12.** ANS:

**a)** The slope represents the number of seconds by which the winning time is reduced each year.

The *y*-intercept is approximately the winning time from the 1992 Olympics.

**b)** Use the regression function:



Rounding up to the next multiple of 4: 40.

The winning time will be below 21 s for the first time 40 years after 1992, in 2032.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | regression function | extrapolate

**13.** ANS:

I used a spreadsheet to determine the equation of the linear regression function:

*B* = 0.0287*a* – 12.5

where *B* represents the number of beds and *a* represents the area of the store.

*B* = 0.0287*a* – 12.5

*B* = 0.0287(1650) – 12.5

*B* = 34.855

The retailer can display about 35 beds.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | regression function | extrapolate

**14.** ANS:

I used a spreadsheet to determine the equation of the linear regression function:

*B* = 0.0259*a* – 9.4

where *B* represents the number of beds and *a* represents the area of the store.

*B* = 0.0259*a* – 9.4

*B* = 0.0259(900) – 9.4

*B* = 13.91

The retailer can display about 14 beds.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

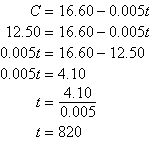
KEY: polynomial functions | regression function | interpolate

**15.** ANS:

I used a spreadsheet to determine the equation of the linear regression function:

*C* = 16.60 – 0.005*t*

where *C* represents the cost per T-shirt and *t* represents the number of T-shirts.

**

She should order more than 820 T-shirts to keep the cost below $12.50 per T-shirt.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | regression function | extrapolate

**16.** ANS:

I used a spreadsheet to determine the equation of the linear regression function:

*C* = 15.80 – 0.004*t*

where *C* represents the cost per T-shirt and *t* represents the number of T-shirts.

*C* = 15.80 – 0.004*t*

*C* = 15.80 – 0.004(625)

*C* = 13.30

The cost per T-shirt should be about $13.30 when she orders 625 shirts.

PTS: 1 DIF: Grade 12 REF: Lesson 6.3

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a line of of best fit

KEY: polynomial functions | regression function | interpolate

**17.** ANS:

**a)** This is a quadratic function with a negative leading coefficient, so it must be a parabola that opens down (it extends from quadrant III to quadrant IV). It will have a turning point that is a maximum value, one *y*-intercept, and up to two *x*-intercepts.

**b)** The *y*-intercept is the value when *t* = 0.

*h*(*t*) = –9.7*t*2 + 48.4*t* + 11.5

*h*(0) = –9.7(0)2 + 48.4(0)+ 11.5

*h*(0) = 11.5

This is the initial height of the ball.

**c)** The negative root does not have any meaning here since *t* is time and can only be positive. The positive root is the time when the ball reaches the green.

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

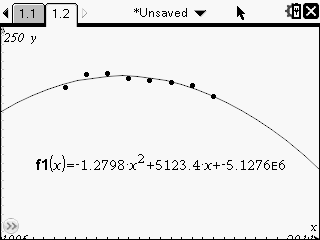
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TOP: Modelling data with a curve of best fit

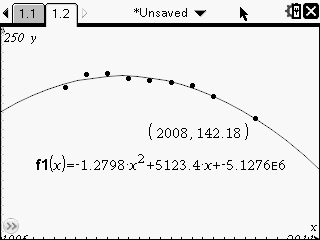
KEY: polynomial functions | regression function | curve of best fit

**18.** ANS:

**a)**



**b)**



Using the curve of best fit, the amount of time spent watching television should drop to about 142 min/day.

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function | curve of best fit | extrapolate

**19.** ANS:

I used a spreadsheet to determine the equation of the quadratic regression function:

*y* = –0.38*x*2 + 1.22*x* + 0.22

Determine the yield when *x* = 1.50:

*y* = –0.38*x*2 + 1.22*x* + 0.22

*y* = –0.38(1.50)2 + 1.22(1.50)+ 0.22

*y* = 1.195

Determine the yield when *x* = 1.75:

*y* = –0.38*x*2 + 1.22*x* + 0.22

*y* = –0.38(1.75)2 + 1.22(1.75)+ 0.22

*y* = 1.191...

The yield is slightly greater when 1.50 kg/ha of fertilizer is used. The farmers should expect about 1.195 t of beets.

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function | curve of best fit | extrapolate

**20.** ANS:

**a)** If *x* is the number of hours since 12:00 and *y* is the depth in feet, then the equation of the cubic regression function, using a spreadsheet, is:

*y* = –0.015*x*3 + 0.095*x*2 + 0.361*x* + 12.290

**b)** Determine the depth when *x* = 5:

*y* = –0.015*x*3 + 0.095*x*2 + 0.361*x* + 12.290

*y* = –0.015(5)3 + 0.095(5)2 + 0.361(5)+ 12.290

*y* = 14.595

The depth of the water is about 14.6 ft at 17:00.

**c)** Determine the depth when *x* = –1.5:

*y* = –0.015*x*3 + 0.095*x*2 + 0.361*x* + 12.290

*y* = –0.015(–1.5)3 + 0.095(–1.5)2 + 0.361(–1.5)+ 12.290

*y* = 12.012...

The depth of the water is about 12.0 ft at 10:30.

PTS: 1 DIF: Grade 12 REF: Lesson 6.4

OBJ: 1.4 Graph data and determine the polynomial function that best approximates the data. | 1.5 Interpret the graph of a polynomial function that models a situation, and explain the reasoning. | 1.6 Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.

TOP: Modelling data with a curve of best fit

KEY: polynomial functions | regression function | curve of best fit | extrapolate | interpolate