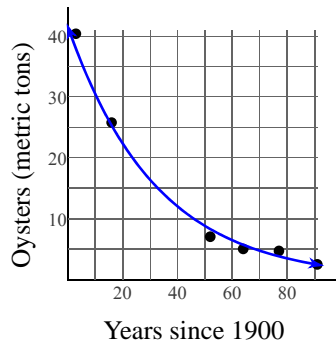


## Using Statistical Models

Date \_\_\_\_\_ Period \_\_\_\_\_

- 1) The oyster population of the Chesapeake Bay has been in decline for over 100 years. This can be expressed by the equation  $y = 41.6 \cdot 0.969^x$  where  $x$  is the number of years since 1900 and  $y$  is the amount of oysters harvested in metric tons.

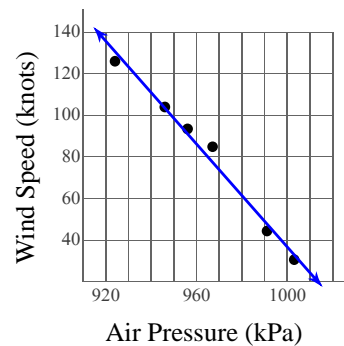


What does the y-intercept of this function represent?

- 2) The Hurricane Hunters took the following measurements from a hurricane over several days as it developed:

Air Pressure (kPa)	Wind Speed (knots)
924	126
946	104
956	93.5
967	84.9
991	44.4
1,003	30.6

They found that the air pressure and wind speed are related in the following way:  
 $y = -1.24x + 1270$  where  $x$  is the air pressure in millibars (kPa) and  $y$  is the maximum sustained wind speed in knots (nautical miles per hour).



- a) Using the model, what would be the wind speed of a hurricane with an air pressure of 980 kPa? Round your answer to the nearest knot.

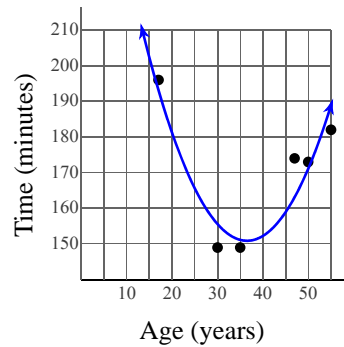
- b) According to the model, a hurricane with an air pressure of 891 kPa would have what wind speed? Round your answer to the nearest knot.

- c) The model indicates that a wind speed of 110 knots is associated with what air pressure? Round your answer to the nearest millibar.

- 3) The time for the fastest runner for their age in the Marine Corps Marathon is given for several ages:

Age	Time (minutes)
17	196
30	149
35	149
47	174
50	173
55	182

This can be modeled by the equation  $y = 0.111x^2 - 8.1x + 299$  where  $x$  is the age and  $y$  is the number of minutes taken.

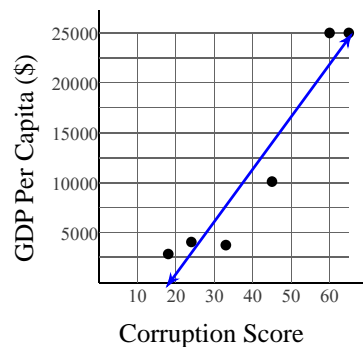


- a) Using this model, what would be the time for the fastest 41-year-old? Round your answer to the nearest hundredth.
- b) According to the model, what would be the time for the fastest 83-year-old? Round your answer to the nearest hundredth.
- c) What age(s) correspond to a time of 171 minutes? Round your answer(s) to the nearest tenth.

- 4) Economists have found that the amount of corruption in a country is correlated to the productivity of that country. Productivity is measured by gross domestic product (GDP) per capita. Corruption is measured on a scale from 0 to 100 with 0 being highly corrupt and 100 being least corrupt:

Corruption Score	GDP Per Capita (\$)
18	2,850
24	4,050
33	3,740
45	10,100
60	25,000
65	25,000

This can be modeled by the equation  $y = 525x - 9640$  where  $x$  is the corruption score and  $y$  is GDP per capita in dollars.

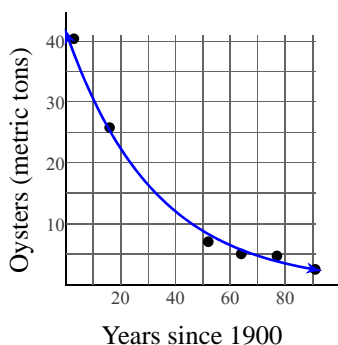


- a) According to the model, what would be the GDP per capita of a country with a corruption score of 38? Round your answer to the nearest dollar.
- b) Using this model, a country with a corruption score of 75 would have what GDP per capita? Round your answer to the nearest dollar.
- c) A GDP per capita of \$17,000 corresponds to what corruption score, according to the model? Round your answer to the nearest whole number.

## Using Statistical Models

Date \_\_\_\_\_ Period \_\_\_\_\_

- 1) The oyster population of the Chesapeake Bay has been in decline for over 100 years. This can be expressed by the equation  $y = 41.6 \cdot 0.969^x$  where  $x$  is the number of years since 1900 and  $y$  is the amount of oysters harvested in metric tons.



What does the y-intercept of this function represent?

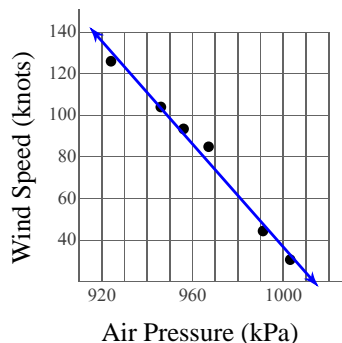
**The amount of oysters harvested in 1900**

- 2) The Hurricane Hunters took the following measurements from a hurricane over several days as it developed:

Air Pressure (kPa)	Wind Speed (knots)
924	126
946	104
956	93.5
967	84.9
991	44.4
1,003	30.6

They found that the air pressure and wind speed are related in the following way:

$y = -1.24x + 1270$  where  $x$  is the air pressure in millibars (kPa) and  $y$  is the maximum sustained wind speed in knots (nautical miles per hour).



- a) Using the model, what would be the wind speed of a hurricane with an air pressure of 980 kPa? Round your answer to the nearest knot.

**55 knots**

- b) According to the model, a hurricane with an air pressure of 891 kPa would have what wind speed? Round your answer to the nearest knot.

**165 knots**

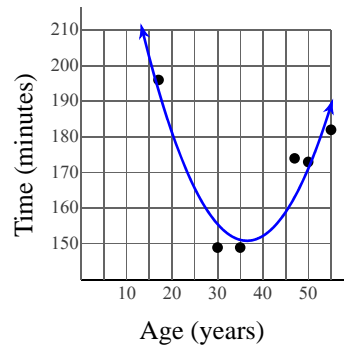
- c) The model indicates that a wind speed of 110 knots is associated with what air pressure? Round your answer to the nearest millibar.

**935 kPa**

- 3) The time for the fastest runner for their age in the Marine Corps Marathon is given for several ages:

Age	Time (minutes)
17	196
30	149
35	149
47	174
50	173
55	182

This can be modeled by the equation  $y = 0.111x^2 - 8.1x + 299$  where  $x$  is the age and  $y$  is the number of minutes taken.



- a) Using this model, what would be the time for the fastest 41-year-old? Round your answer to the nearest hundredth.

**153.49 minutes**

- b) According to the model, what would be the time for the fastest 83-year-old? Round your answer to the nearest hundredth.

**391.38 minutes**

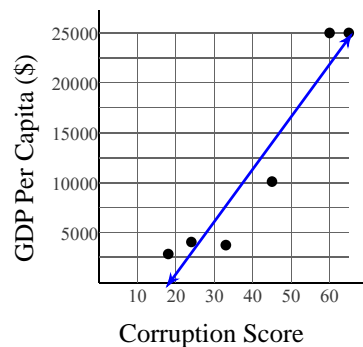
- c) What age(s) correspond to a time of 171 minutes? Round your answer(s) to the nearest tenth.

**23.1 years old and 49.8 years old**

- 4) Economists have found that the amount of corruption in a country is correlated to the productivity of that country. Productivity is measured by gross domestic product (GDP) per capita. Corruption is measured on a scale from 0 to 100 with 0 being highly corrupt and 100 being least corrupt:

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This can be modeled by the equation  $y = 525x - 9640$  where  $x$  is the corruption score and  $y$  is GDP per capita in dollars.



- a) According to the model, what would be the GDP per capita of a country with a corruption score of 38? Round your answer to the nearest dollar.

**\$10,310**

- b) Using this model, a country with a corruption score of 75 would have what GDP per capita? Round your answer to the nearest dollar.

**\$29,735**

- c) A GDP per capita of \$17,000 corresponds to what corruption score, according to the model? Round your answer to the nearest whole number.

**15**