The table gives the surface area of water that is covered by an oil spill as a function of time.

Time (min)	Surface Area (m^2)
1	2
2	4
3	7
4	11
5	14
6	29

a) Create a scatter plot of the data

b) Perform the following types of regression
- Linear $y_1 \sim mx_1 + b$
- Quadratic $y_1 \sim ax_1^2 + bx_1 + c$
- Exponential $y_1 \sim a(b)^{(x_1 - d)} + c$

c) Assuming the spill is spreading isotropically, which model do you think makes the most sense for t > 0? Why?

d) Use the model that you chose in c) to predict
- i) The size of the spill after 10 minutes
- ii) The length of time it will take for the spill to reach a diameter of 30 m

$$y = 0.34(1.86)^{x+1.02} + 1.83$$

$$= 0.34(1.86)^{10+1.02} + 1.83$$

$$= 323.06 \text{ m}^2$$

$$\text{Area} = \pi r^2$$

$$= \pi (15)^2$$

$$= 706.86$$

$$= 225\pi$$

Solve $225\pi = 0.34(1.86)^{x+1.02} + 1.83$

OR

DESMOS says → 11.26

A good mathematical model

- is useful for both interpolating and extrapolating from given data in order to make predictions

-predicting within data

-predicting outside data range

- can be used, in conjunction with other considerations, to aid in decision making

The population of Decimal point has been steadily growing for several decades. The table gives the population at 5-year intervals, beginning in 1920, the year the town's population reached 1000.

a) Create a scatter plot

b) Construct a model that best fits the data
- Linear
- Quadratic
- Exponential

Time (years)	Population
0	1000
5	1100
10	1180
15	1250
20	1380
25	1500
30	1600

c) Suppose that it is decided that a Rec Centre should be built once the town's population reaches 5000. When should the Rec Centre be built?

Using Desmos.
after 104 years

∴ the Rec Centre should be built in 2024.

pg. 404
1 - 5, 7, 8, 11