MBF3C Chapter 7 – Exponents **Name:** Ms. Hagen

7.3 Investigating Exponential Relationships
Learning Goal: We are learning to investigate exponential relationships.

1. Determine if each relation is exponential.

↳ $y = (\text{base})^x$ Line $y = 2x + 4$

a)

x	y
1	2
2	4
3	6
4	8
5	10
6	12

$y = 2x$

Line. ∴ not exponential

b)

x	y
1	3
2	9
3	27
4	81
5	243
6	729

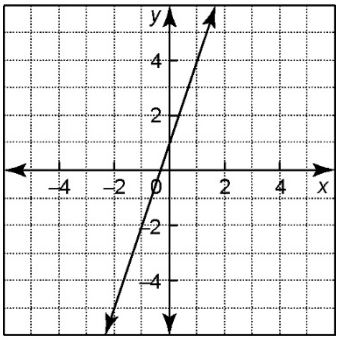
3^1, 3^2, 3^3

$y = 3^x$

∴ exponential

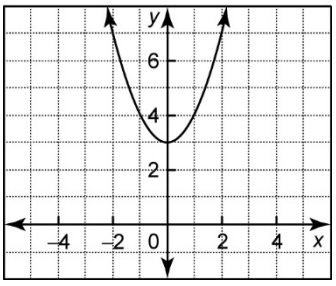
2. Which of these graphs could represent an exponential relation? Explain.

a)



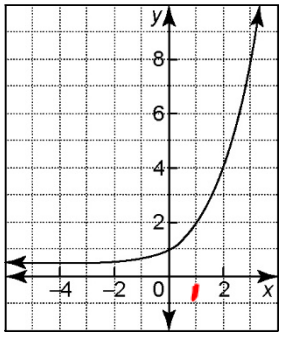
Linear Relation

b)



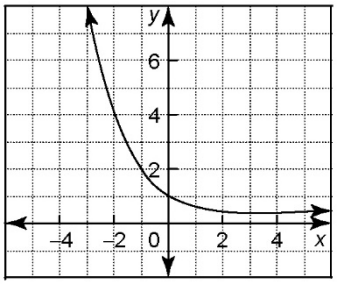
parabola
quadratic
$y = x^2$

c)



exponential → growth

d)



Exponential
negative
→ decay

lose value

3. A car purchased for $38 000 depreciates by 30% each year. This can be represented by the relation $V = 38\,000(0.70)^t$, where V is the value of the car in dollars and t is the time in years. Find the value of the car after each period.

a) 1 year $= t$

$V = 38000(0.7)^1$

$V = \$26{,}600$

b) 3 years

c) 5 years $= t$

$V = 38000(0.7)^5$

$V = 38000(0.16807)$

$V = \$6{,}386.66$

d) 9 years

4. Kendra won a contest. She will be paid a sum of money each week for 26 weeks. The first week she will be paid 1¢. The amount doubles each week.

a) How much will Kendra be paid in the eighth week?

Week one = $\$0.01$
two = $\$0.02$
three = $\$0.04$
week 4 = $\$0.08$
5 = $\$0.16$
6 = $\$0.32$
7 = $\$0.64$
8 = $\$1.28$

b) How much will she be paid in the 20th week?

$P = 0.01(2)^{w-1}$

Test week 8: $P = 0.01(2)^7 = \$1.28$

20th week: $P = 0.01(2)^{19} = \$5{,}242.88$

c) How much will she be paid in the last week?

26 → $P = 0.01(2)^{25}$

$= \$335{,}544.32$

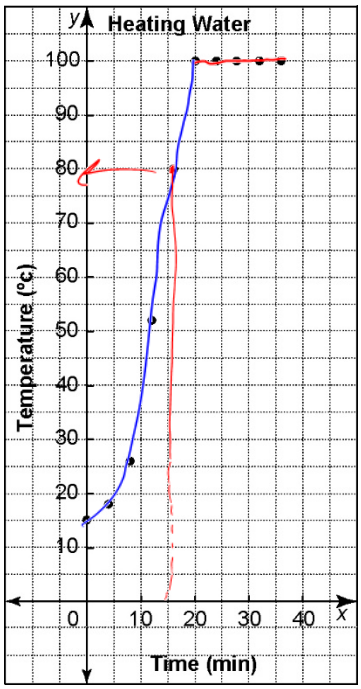
∴ She earns a lot of money.

5. The number of algae cells in a pond doubles every 3 days, until the total surface of the pond is completely covered. Today, Tory determines that one sixteenth of the pond is covered in algae.

a) What fraction of the pond will be covered in 6 days?

b) How long will it take for the pond to be completely covered? Explain.

6. The graph shows the temperature of a pot of water over time.



a) Describe the shape of the graph for the first 20 min.

Looks like an exponential relation

b) Describe the shape of the graph after the first 20 min.

It is a line.

c) What is the approximate temperature after 15 min?

80°C

d) Suggest reasons for the change in the shape of the graph.

100°C is the boiling point and it cannot go higher.

7. A car depreciates at a rate of 20% per year. So, at the end of each year, the car is worth 80% of its value from the beginning of the year.

a) What percent of its original value is the car worth at the end of the third year?

b) How long will it take the car to be worth 20% of its original value?

8. The table shows the price per litre of gas over time. (Just for fun, we will do in Excel!!!) Desmos.

Time (years)	Price (¢)
0	0.52
1	0.59
2	0.67
3	0.79
4	0.92
5	1.046

a) Make a scatter plot of the data.
b) Draw the curve of best fit.
c) Is the graph an example of exponential growth? Explain.
d) If the trend continues, what will be the price of a litre of gas in 2 years?

Success Criteria:

- I can identify if a graph or table is an exponential relation.
- I can use an exponential equation to solve various problems.
- I can analyze a graph and use it to solve various problems.