

5.3 EQ: What do exponential functions look like?

Linear Functions:

As x changes at a constant rate, y changes with a common difference (add/subtract same amount)

Exponential Functions:

As x changes at a constant rate, y changes with a common ratio. (multiply/divide by same amount)

Example 1: Identify which functions are linear or exponential.

a)

| | | | | |
|---|----|---|---|---|
| X | 1 | 2 | 3 | 4 |
| Y | -1 | 1 | 3 | 5 |

\checkmark \checkmark \checkmark
 $*-1$ $*3$
 $+2$ $+2$ $+2$

Linear

Not
Common
ratio
Common
difference
;

b)

| | | | | |
|---|---|---|----|-----|
| X | 1 | 2 | 3 | 4 |
| Y | 2 | 8 | 32 | 128 |

\checkmark \checkmark \checkmark
 $*4$ $*4$ $*4$
 $+6$ $+24$

Exponential

Common
ratio ;
Not common
difference

c)

| | | | | |
|---|---|---|----|----|
| X | 0 | 1 | 2 | 3 |
| Y | 6 | 9 | 12 | 15 |

+3 +3 +3

Common difference
↳ Linear

e) $f(x) = 3 \cdot 6^x$ "f of x"

| | | | | |
|---|----|-----|-----|------|
| x | 1 | 2 | 3 | 4 |
| y | 18 | 108 | 648 | 3888 |

x6 x6 x6
Exponential

g) Jack pays \$30 each month for a gym membership, and a \$10 startup fee.

| | | | |
|-------|----|----|-----|
| month | 1 | 2 | 3 |
| \$ | 40 | 70 | 100 |

+30 +30

Linear

d)

| | | | | |
|---|----|----|----|---|
| X | 0 | 1 | 2 | 3 |
| Y | 70 | 49 | 28 | 7 |

-21 -21 -21

Linear

f) $f(x) = 4x + 1$

| | | | | |
|---|---|---|----|----|
| x | 1 | 2 | 3 | 4 |
| y | 5 | 9 | 13 | 17 |

+4 +4 +4
Linear

h) A culture starts with 120 bacteria. The number of bacteria in the culture is doubled each day.

x2

Exponential

Summary:

pg. 4