

Exponential graphs

1

a Yes

b Yes

c No

d No

e No

f No

2 Graph B

3

a Graph R

b For $x < 0$, the graph of $y = (5)^x$ is below the graph of $y = (3)^x$. This is because negative values of x result in fractional function values, and for any negative value of x , $(5)^x$ will result in a smaller value than $(3)^x$.

4

a Increasing

b Decreasing

c Decreasing

d Increasing

e Increasing

f Decreasing

g Decreasing

h Increasing

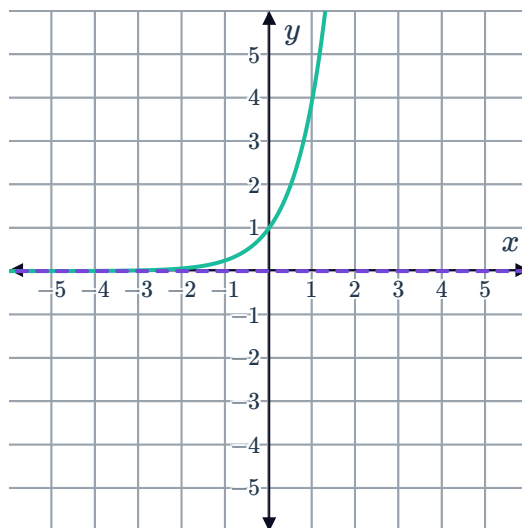
Increasing exponential graphs

5

a

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

b



c As x increases, the y -values also increase.

d As x decreases, the y -values also decrease.

e No

f $y = 1$

6

a

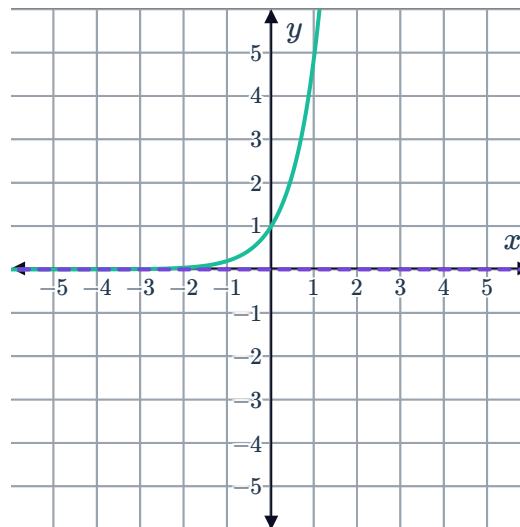
i 1

ii

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

iii $y = 0$

iv



b

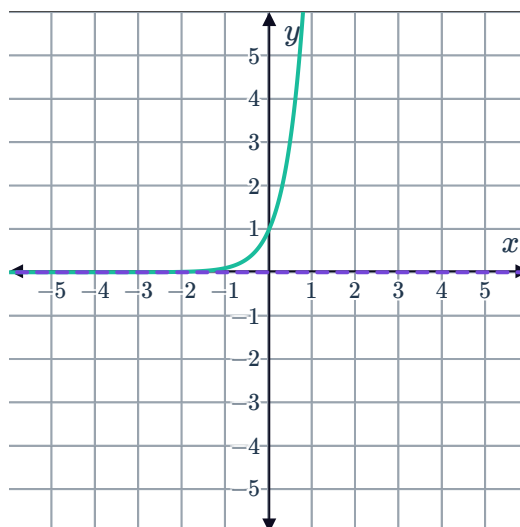
i $y = 1$

ii

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{1000}$	$\frac{1}{100}$	$\frac{1}{10}$	1	10	100	1000

iii $y = 0$

iv



c

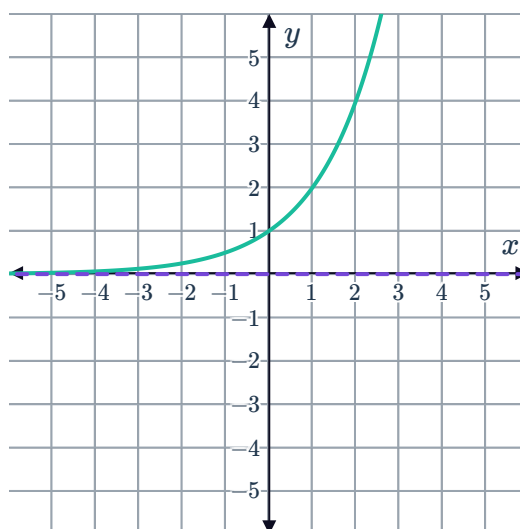
i $y = 1$

ii

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

iii $y = 0$

iv

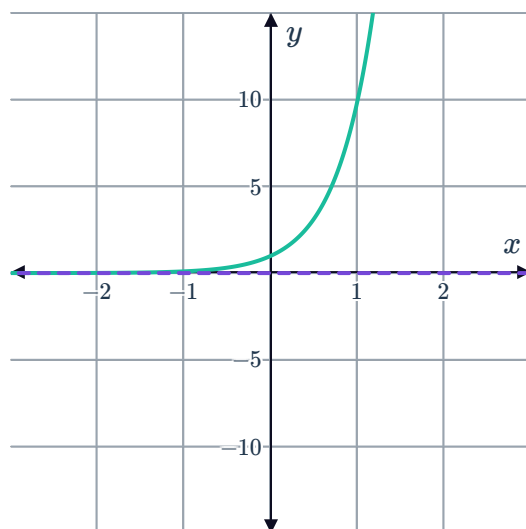


a No

c ∞

e $y = 1$

g



b No

d 0

f 0

8

a

i $y = 0$

ii $y = 0$

b

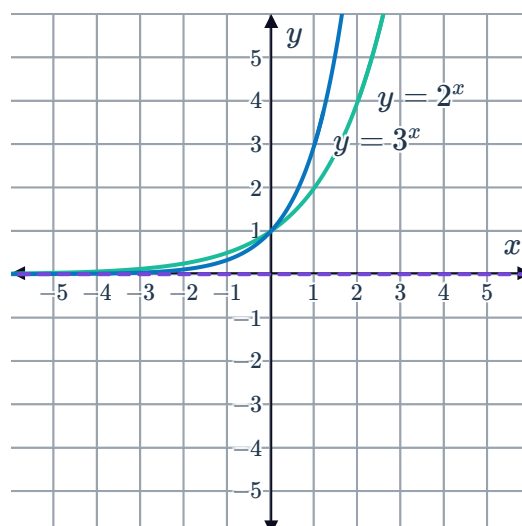
i

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

ii

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27

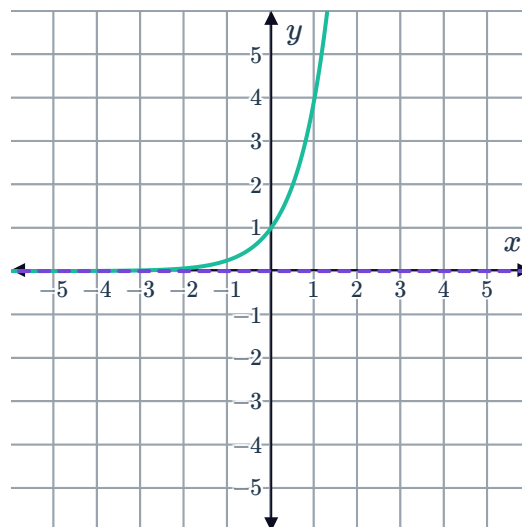
c



d $(0, 1)$

9

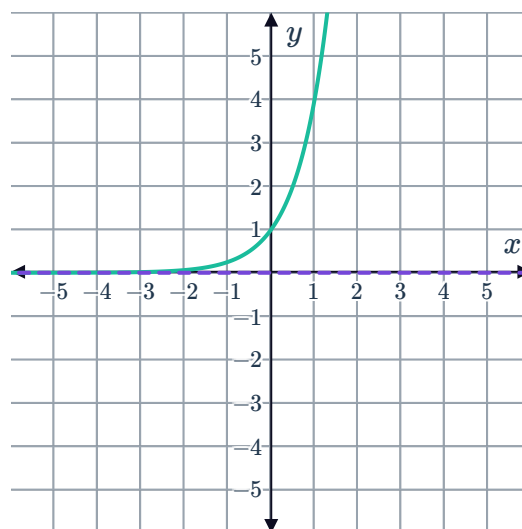
a



b

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{64}$	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

c



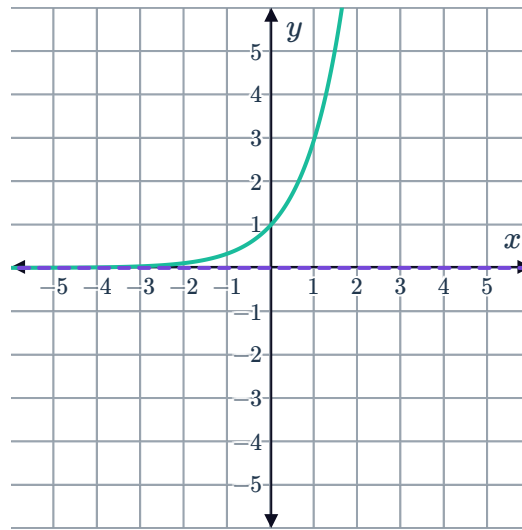
d The two graphs are the same.

Decreasing exponential graphs

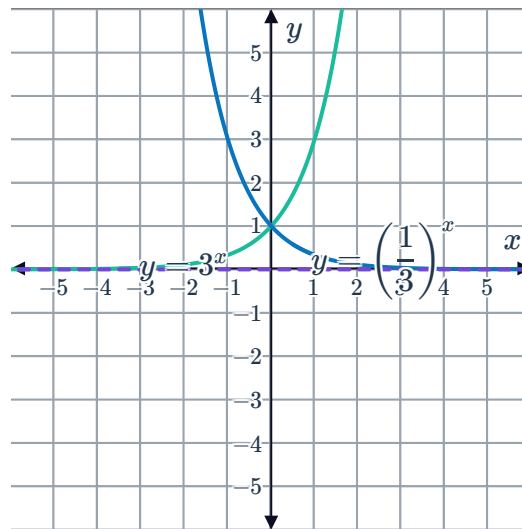
10

a $y = 3^{-x}$ and $y = \frac{1}{3^x}$.

b



c



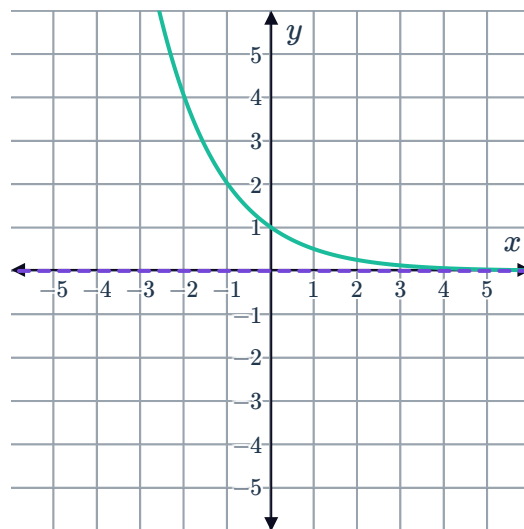
11 $y = 6^{-x}$

12

a

x	-3	-2	-1	0	1	2	3
y	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

b



c As x increases, the y -values decrease.

d As x decreases, the y -values increase.

e No

f $y = 1$

13

a

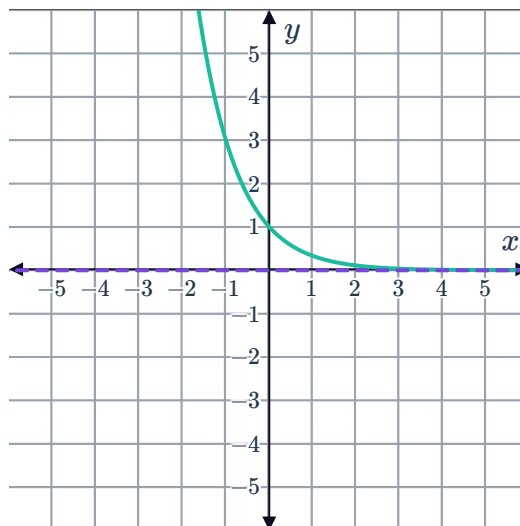
i $y = 1$

ii

x	-3	-2	-1	0	1	2	3
y	27	9	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$

iii $y = 0$

iv



b

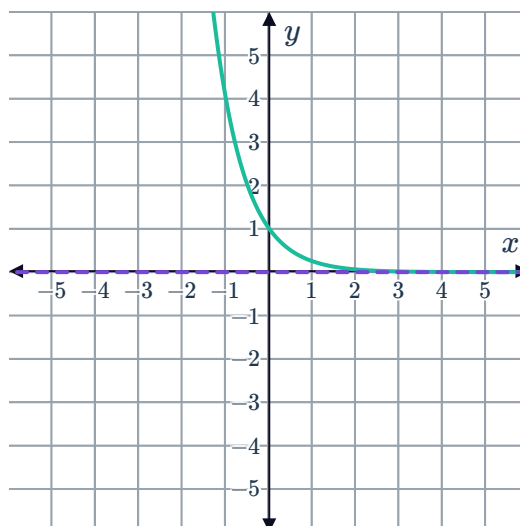
i $y = 1$

ii

x	-3	-2	-1	0	1	2	3
y	64	16	4	1	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{1}{64}$

iii $y = 0$

iv



c

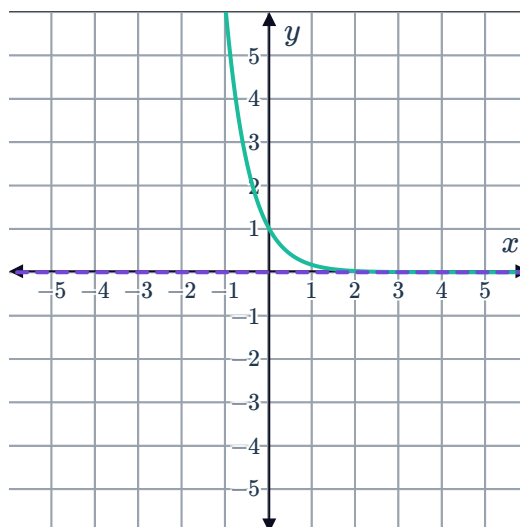
i $y = 1$

ii

x	-3	-2	-1	0	1	2	3
y	216	36	6	1	$\frac{1}{6}$	$\frac{1}{36}$	$\frac{1}{216}$

iii $y = 0$

iv



14

a No

c 0

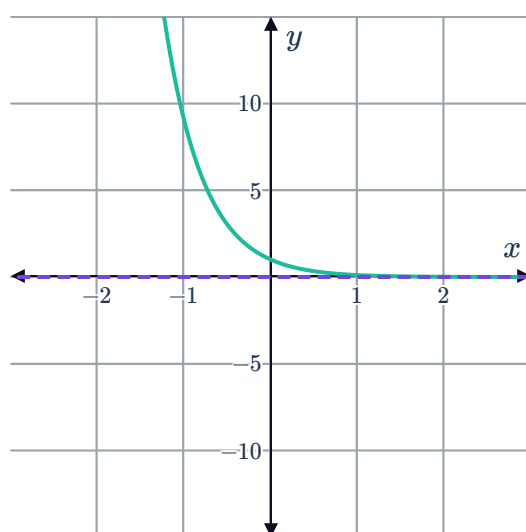
e $y = 1$

g

b No

d ∞

f 0



15

a

i $y = 0$

ii $y = 0$

b

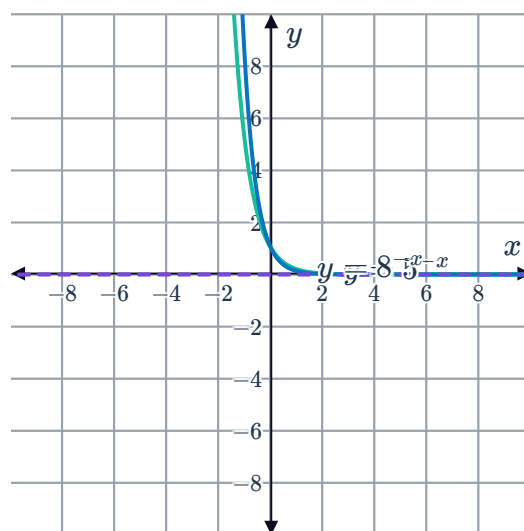
i

x	-3	-2	-1	0	1	2	3
y	125	25	5	1	$\frac{1}{5}$	$\frac{1}{25}$	$\frac{1}{125}$

ii

x	-3	-2	-1	0	1	2	3
y				1	$\frac{1}{8}$	$\frac{1}{64}$	$\frac{1}{512}$

c

d $(0, 1)$

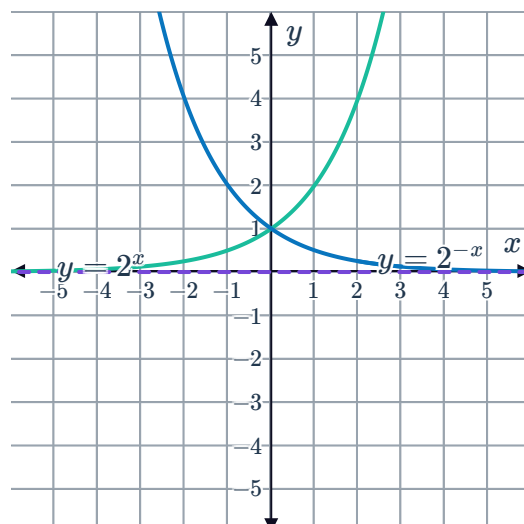
Dilations and reflections

16 By reflecting the graph about the y -axis.

17

a A reflection about the y -axis.

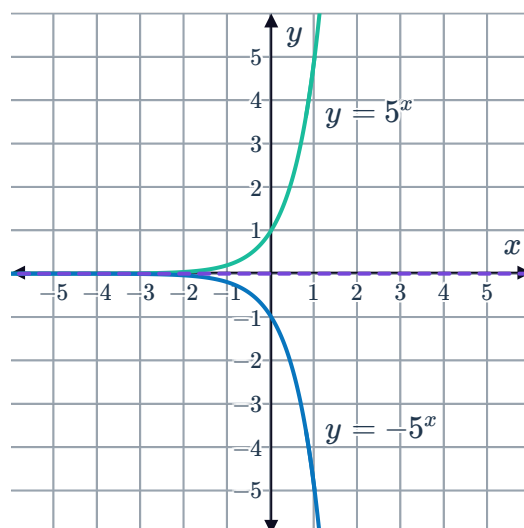
b



18

a A reflection about the x -axis.

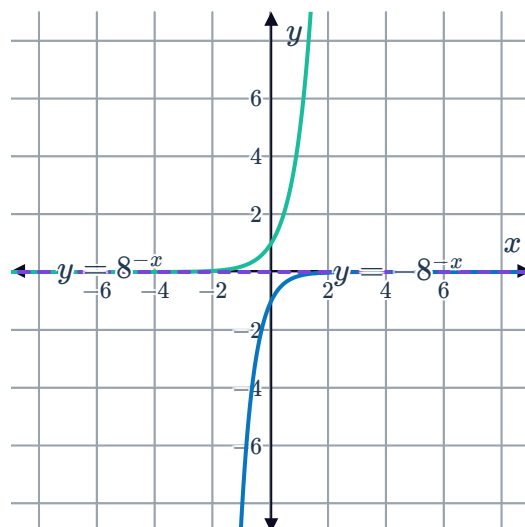
b



19

a A reflection about both the x -axis and y -axis.

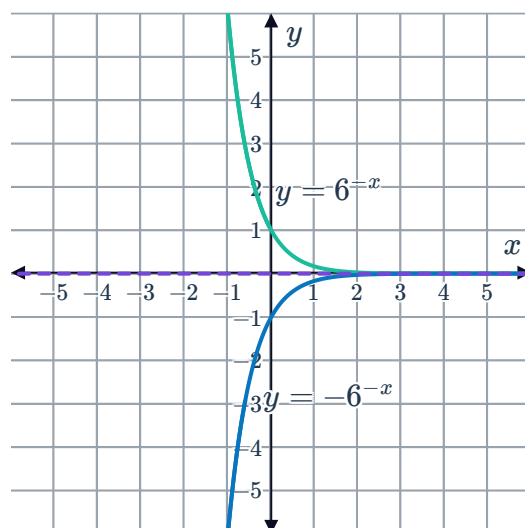
b



20

a A reflection about the x -axis.

b



c As x increases, the graph of $y = -6^{-x}$ is increasing at a decreasing rate.

21 $y = 4^x$

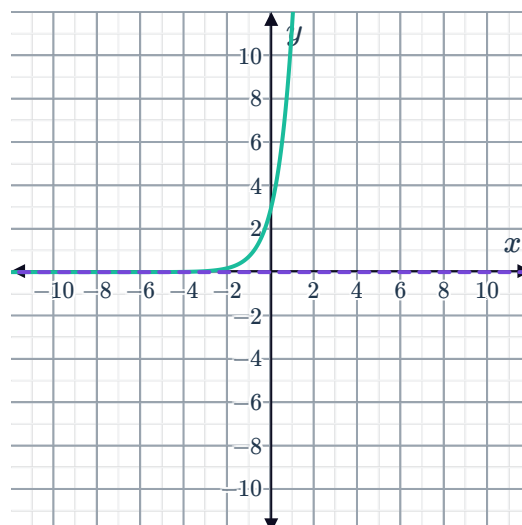
22

a $y = 3$

b No

c ∞

d

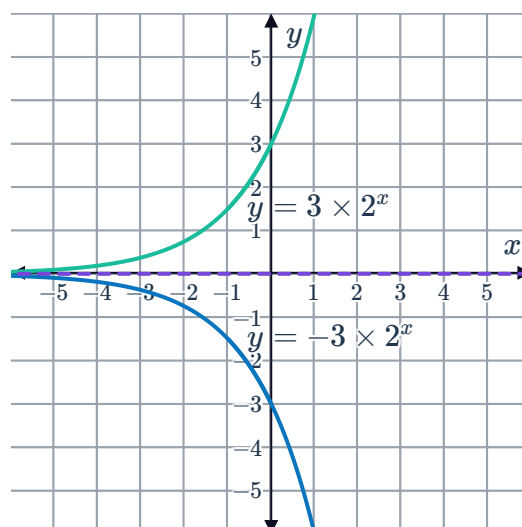


23

a $y = 3$

b A reflection about x -axis

c



d $y = 3 \times 2^x$

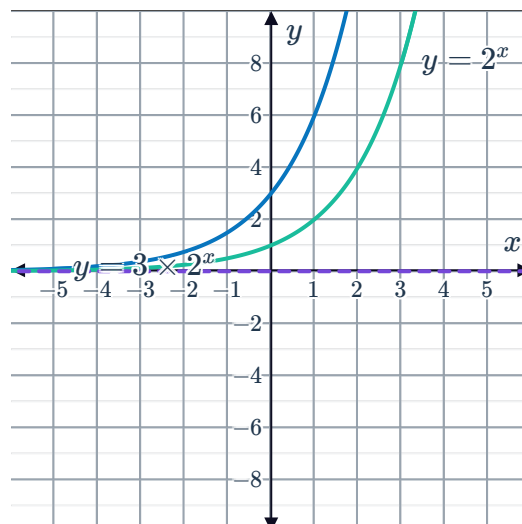
24

a

Point on original graph	$\left(-1, \frac{1}{2}\right)$	$(0, 1)$	$(1, 2)$	$(2, 4)$
Point on new graph	$\left(-1, \frac{3}{2}\right)$	$(0, 3)$	$(1, 6)$	$(2, 12)$

b $y = 3 \times 2^x$

c



d Above

e Above

Translations

25

a $y = 1$

b $y = 4$

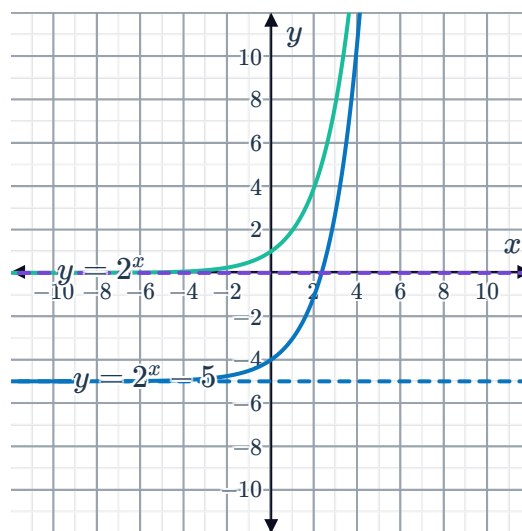
c $y = 0$

d $y = 3$

26

a Move the graph downwards by 5 units.

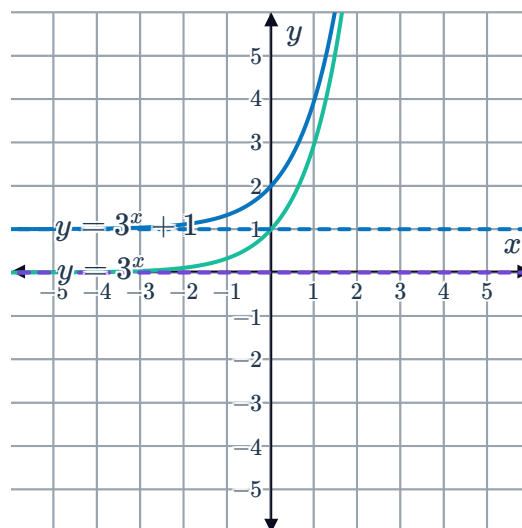
b



27

a Move the graph upwards by 1 unit.

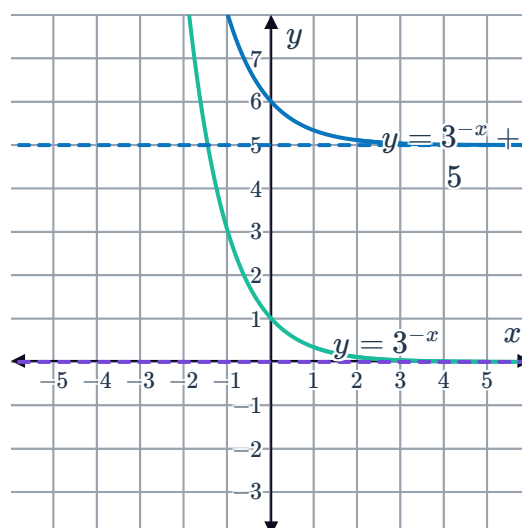
b



28

a Move the graph upwards by 5 units.

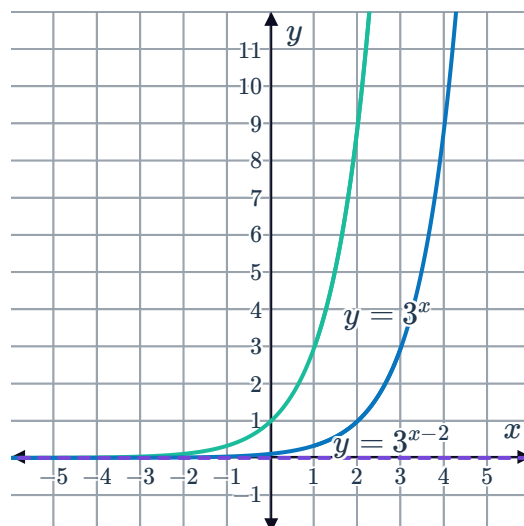
b



29

a Move the graph to the right by 2 units.

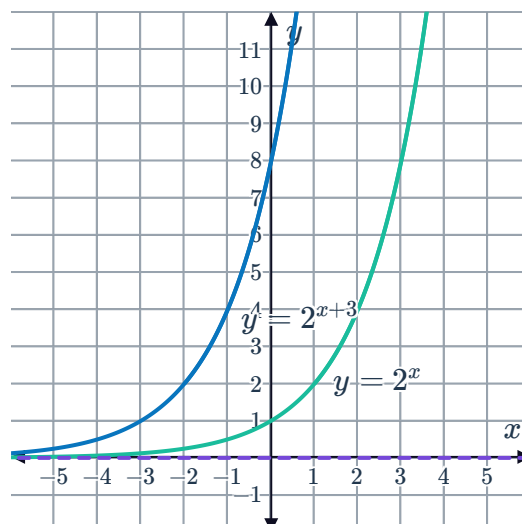
b



30

a Move the graph to the left by 3 units.

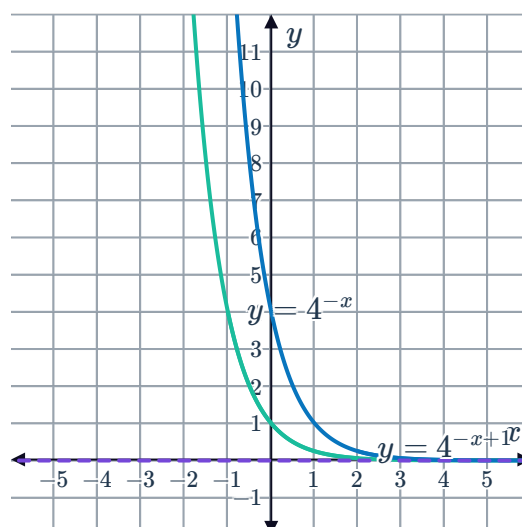
b



31

a Move the graph to the left by 1 units.

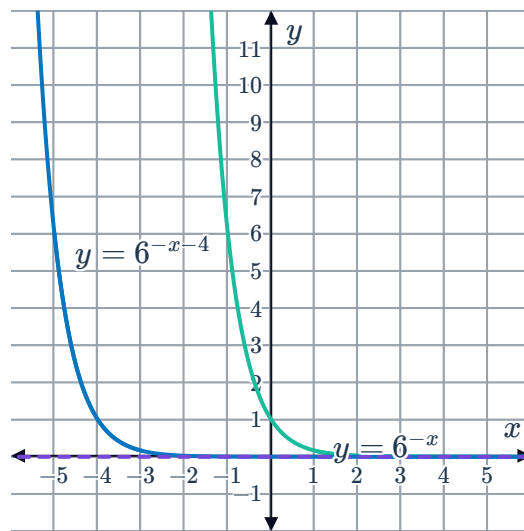
b



32

a Move the graph to the right by 4 units.

b



33 $y = 2^x - 9$

34 $y = 12^{x+6}$

35 $y = 3^{-x-2} - 7$