PRIOR LEARNING

Logarithmic functions

1 Simplify each expression, leaving your answer in index form.

a $x^7 \times x^9$

b $m^4 \times m^3$

c $(m^4)^3$

d $x^6 \times x^{12} \times x^3$

e $(x^4)^3 \times x^5$

f $m^4 \times (m^5)^2 \times m$

2 Simplify each expression, leaving your answer in index form.

a $x^{-2} \times x^8$

b $(x^{-2})^3$

c $y^{-12} \times y^5$

d $y^8 \div y^3$

e $x^2 \div x^{-4}$

f $(m^4)^{-2} \times (m^3)^5$

g $y^6 \times y^{14} \div y^5$

h $(m^3)^4 \div (m^2)^3$

3 Simplify each expression.

a $9^{\frac{1}{2}}$

b $27^{\frac{1}{3}}$

c $16^{\frac{3}{4}}$

d $16^{-\frac{1}{2}}$

e $27^{-\frac{2}{3}}$

f $\left(\frac{1}{8}\right)^{-\frac{1}{3}}$

4 Write each expression in index form.

a $\sqrt{8}$

b $\sqrt[3]{x}$

c $\left(y^6\right)^{\frac{1}{2}}$

d $\left(10^{\frac{1}{2}}\right)^5$

e $\left(16^{\frac{1}{2}}\right)^{-2}$

f $\left(27^{\frac{2}{3}}\right)^{\frac{1}{2}}$

5 Simplify each expression, leaving only positive indices in the answer.

a $\left(x^{\frac{1}{2}} \times x\right)^5$

b $\dfrac{(-2xy)^2}{2y}$

c $\dfrac{(-x^4y)^3(xy)^5}{-x^8y^8}$

d $\dfrac{x^{-1}y^4}{x^{-5}y^{-3}}$

e $\left(\dfrac{10x^3y^{-2}}{5x^{-1}y^2}\right)^{-1}$

f $x\sqrt[3]{x}$

6 The graph of the function $y = 2x^2$ is shown.

The graph of the function $y = 2(x + a)^2 + b$ can be drawn by translating the graph of $y = 2x^2$ vertically and/or horizontally.

Match each function below to its graph (A to H).

a $y = 2(x - 3)^2$

b $y = 2x^2 - 3$

c $y = 2(x + 3)^2 - 3$

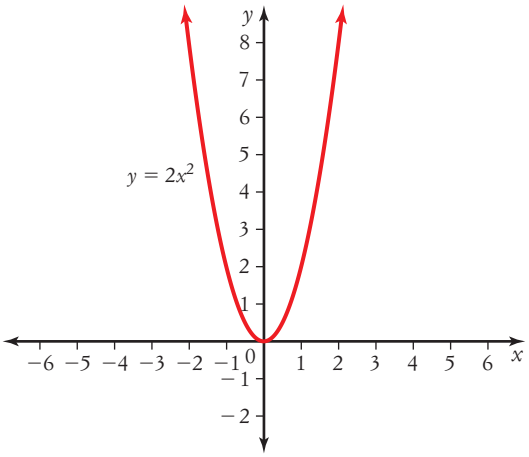
d $y = 2x^2 + 3$

e $y = 2(x - 3)^2 + 3$

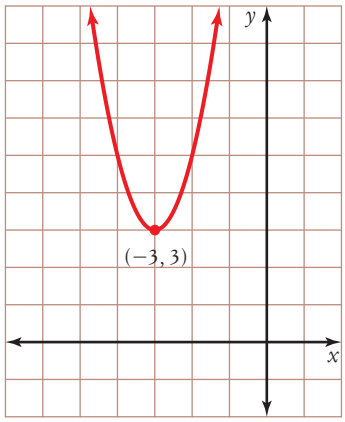
f $y = 2(x + 3)^2$

g $y = 2(x - 3)^2 - 3$

h $y = 2(x + 3)^2 + 3$



A



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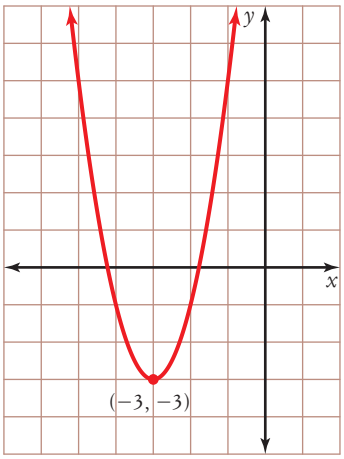

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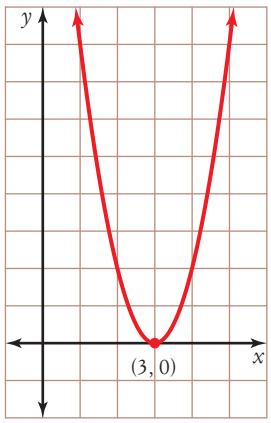

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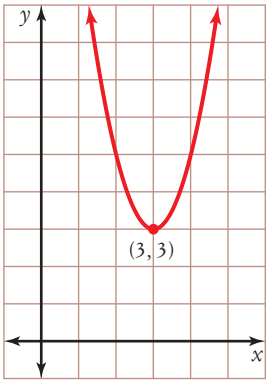

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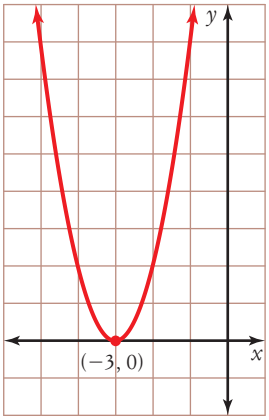

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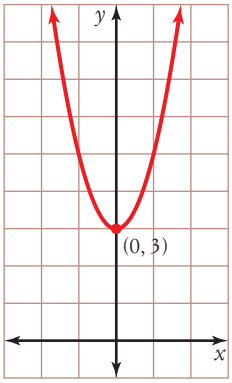

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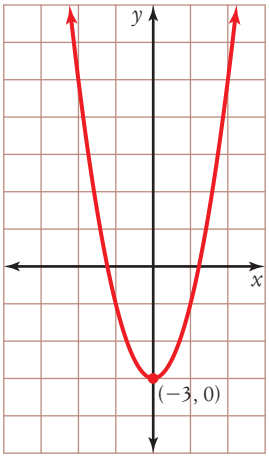

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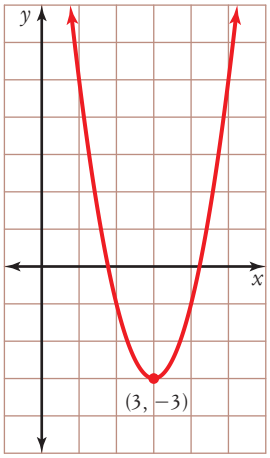

7 Find x if $\log(x) =$

a 1

b 3

c -1

d 0

e $\frac{1}{2}$

8 For each value of $\log_2(x)$ below, find the value of x.

a 2

b 4

c -3

d $-\frac{1}{2}$

e 0

9 For each value of $\log_{\frac{1}{2}}(x)$ below, find the value of x.

a 2

b 1

c 0

d -1

e 4

10 Evaluate each logarithm.

a $\log_3(81)$

b $\log_3(27)$

c $\log_3\sqrt{3}$

d $\log_3\sqrt{27}$

e $\log_3(0)$

11 Evaluate each logarithm.

a $\log_{\frac{1}{3}}(3)$

b $\log_{\frac{1}{3}}(27)$

c $\log_{\frac{1}{3}}\left(\frac{1}{3}\right)$

d $\log_{\frac{1}{3}}\left(\sqrt{27}\right)$

e $\log_{\frac{1}{3}}\left(\frac{1}{\sqrt{3}}\right)$

12 Simplify each expression.

a $\log_5(xy) - \log_5(x^2)$

b $\log_2(8x^2) + \log_2(4x)$

c $\log_3(27xy^2) - \log_3(81xy)$

d $\log_7[(xy)^3] - \log_7(xy)$

e $\log_5(25x^4) - \log_5[(5x)]^2$

13 Find x if:

a $3\log_7(4) + \log_7(5) - \log_7(10) = \log_7(x)$

b $\log_8(40) - \log_8(5^2) = \log_8(x)$

c $\log_6(11) + \log_6(x^2) = \log_6(x)$

Answers

1 **a** x^{16} **b** m^7 **c** m^{12} **d** x^{21} **e** x^{17} **f** m^{15}

2 **a** x^6 **b** x^{-6} **c** y^{-7} **d** y^5
e x^6 **f** m^7 **g** y^{15} **h** m^6

3 **a** 3 **b** 3 **c** 8 **d** $\frac{1}{4}$ **e** $\frac{1}{9}$ **f** 2

4 **a** $8^{\frac{1}{2}}$ **b** $x^{\frac{1}{3}}$ **c** y^3 **d** $10^{\frac{5}{2}}$ **e** $\frac{1}{16}$ **f** 3

5 **a** $x^{\frac{15}{2}}$ **b** $2x^2y$ **c** x^9 **d** x^4y^7 **e** $\frac{y^4}{2x^4}$ **f** $x^{\frac{4}{3}}$

6 **a** C **b** G **c** B **d** F
e D **f** E **g** H **h** A

7 **a** 10 **b** 1000 **c** $\frac{1}{10}$ **d** 1 **e** $\sqrt{10}$

8 **a** 4 **b** 16 **c** $\frac{1}{8}$ **d** $\frac{1}{\sqrt{2}}$ **e** 1

9 **a** $\frac{1}{4}$ **b** $\frac{1}{2}$ **c** 1 **d** 2 **e** 16

10 **a** 4 **b** 3 **c** $\frac{1}{2}$ **d** $\frac{3}{2}$ **e** Not defined

11 **a** -1 **b** -3 **c** 1 **d** 0 **e** $\frac{1}{2}$

12 **a** $\log_5\left(\frac{y}{x}\right)$ **b** $5 + 3\log_2(x)$ **c** $\log_3(y) - 1$ **d** $2\log_7(xy)$ **e** 0

13 **a** 32 **b** $\frac{8}{5}$ **c** $\frac{1}{11}$