

F.BF.A.1: Operations with Functions

- For all real values of x , if $f(x) = (x - 3)^2$ and $g(x) = (x + 3)^2$, what is $f(x) - g(x)$?
 - 1) -18
 - 2) 0
 - 3) $-12x$
 - 4) $2x^2 - 12x - 18$
- If $f(x) = x^2 + 9$ and $g(x) = x + 3$, which operation would not result in a polynomial expression?
 - 1) $f(x) + g(x)$
 - 2) $f(x) - g(x)$
 - 3) $f(x) \cdot g(x)$
 - 4) $f(x) \div g(x)$
- If $g(c) = 1 - c^2$ and $m(c) = c + 1$, then which statement is *not* true?
 - 1) $g(c) \cdot m(c) = 1 + c - c^2 - c^3$
 - 2) $g(c) + m(c) = 2 + c - c^2$
 - 3) $m(c) - g(c) = c + c^2$
 - 4) $\frac{m(c)}{g(c)} = \frac{-1}{1 - c}$
- If $p(x) = ab^x$ and $r(x) = cd^x$, then $p(x) \cdot r(x)$ equals
 - 1) $ac(b + d)^x$
 - 2) $ac(b + d)^{2x}$
 - 3) $ac(bd)^x$
 - 4) $ac(bd)^{x^2}$
- Given $f(x) = 2x^2 + 7x - 15$ and $g(x) = 3 - 2x$, what is $\frac{f(x)}{g(x)}$ for all defined values?
 - 1) $-x - 5$
 - 2) $-x + 5$
 - 3) $x - 5$
 - 4) $x + 5$
- The volume of a cardboard box can be modeled by $V(x)$, which is the product of the length, width, and height, x . If the length can be represented by $L(x) = 18 - 2x$ and the width can be represented by $W(x) = 18 - 2x$, then which function represents $V(x)$?
 - 1) $V(x) = 4x^2 - 72x + 324$
 - 2) $V(x) = 4x^3 - 72x^2 + 324x$
 - 3) $V(x) = -3x + 36$
 - 4) $V(x) = 4x^3 + 324x$
- Chet has \$1200 invested in a bank account modeled by the function $P(n) = 1200(1.002)^n$, where $P(n)$ is the value of his account, in dollars, after n months. Chet's debt is modeled by the function $Q(n) = 100n$, where $Q(n)$ is the value of debt, in dollars, after n months. After n months, which function represents Chet's net worth, $R(n)$?
 - 1) $R(n) = 1200(1.002)^n + 100n$
 - 2) $R(n) = 1200(1.002)^{12n} + 100n$
 - 3) $R(n) = 1200(1.002)^n - 100n$
 - 4) $R(n) = 1200(1.002)^{12n} - 100n$
- The revenue, $R(x)$, from selling x units of a product is represented by the equation $R(x) = 35x$, while the total cost, $C(x)$, of making x units of the product is represented by the equation $C(x) = 20x + 500$. The total profit, $P(x)$, is represented by the equation $P(x) = R(x) - C(x)$. For the values of $R(x)$ and $C(x)$ given above, what is $P(x)$?
 - 1) $15x$
 - 2) $15x + 500$
 - 3) $15x - 500$
 - 4) $10x + 100$
- A company produces x units of a product per month, where $C(x)$ represents the total cost and $R(x)$ represents the total revenue for the month. The functions are modeled by $C(x) = 300x + 250$ and $R(x) = -0.5x^2 + 800x - 100$. The profit is the difference between revenue and cost where $P(x) = R(x) - C(x)$. What is the total profit, $P(x)$, for the month?
 - 1) $P(x) = -0.5x^2 + 500x - 150$
 - 2) $P(x) = -0.5x^2 + 500x - 350$
 - 3) $P(x) = -0.5x^2 - 500x + 350$
 - 4) $P(x) = -0.5x^2 + 500x + 350$

- 10 Stone Manufacturing has developed a cost model, $C(x) = 0.18x^3 + 0.02x^2 + 4x + 180$, where x is the number of sprockets sold, in thousands. The sales price can be modeled by $S(x) = 95.4 - 6x$ and the company's revenue by $R(x) = x \cdot S(x)$. The company's profits, $R(x) - C(x)$, could be modeled by
- 1) $0.18x^3 + 6.02x^2 + 91.4x + 180$ 3) $-0.18x^3 - 6.02x^2 + 91.4x - 180$
 2) $0.18x^3 - 5.98x^2 - 91.4x + 180$ 4) $0.18x^3 + 5.98x^2 + 99.4x + 180$
- 11 A manufacturing company has developed a cost model, $C(x) = 0.15x^3 + 0.01x^2 + 2x + 120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x) = 30 - 0.01x$. Therefore, revenue is modeled by $R(x) = x \cdot S(x)$. The company's profit, $P(x) = R(x) - C(x)$, could be modeled by
- 1) $0.15x^3 + 0.02x^2 - 28x + 120$ 3) $-0.15x^3 + 0.01x^2 - 2.01x - 120$
 2) $-0.15x^3 - 0.02x^2 + 28x - 120$ 4) $-0.15x^3 + 32x + 120$
- 12 The profit function, $p(x)$, for a company is the cost function, $c(x)$, subtracted from the revenue function, $r(x)$. The profit function for the Acme Corporation is $p(x) = -0.5x^2 + 250x - 300$ and the revenue function is $r(x) = -0.3x^2 + 150x$. The cost function for the Acme Corporation is
- 1) $c(x) = 0.2x^2 - 100x + 300$ 3) $c(x) = -0.2x^2 + 100x - 300$
 2) $c(x) = 0.2x^2 + 100x + 300$ 4) $c(x) = -0.8x^2 + 400x - 300$
- 13 The profit function, $p(x)$, is found by subtracting the cost function, $c(x)$, from the revenue function, $r(x)$. Which function below represents the cost function given $p(x) = -15x^2 + 600x + 60$ and $r(x) = -0.4x^2 + 130x + 1200$?
- 1) $c(x) = -14.6x^2 + 470x - 1140$ 3) $c(x) = 14.6x^2 - 470x + 1140$
 2) $c(x) = -14.6x^2 + 730x - 1260$ 4) $c(x) = 14.6x^2 + 730x - 1260$
- 14 Given that $f(x) = 2x + 1$, find $g(x)$ if $g(x) = 2[f(x)]^2 - 1$.
- 15 Given: $f(x) = 2x^2 + x - 3$ and $g(x) = x - 1$
 Express $f(x) \cdot g(x) - [f(x) + g(x)]$ as a polynomial in standard form.
- 16 Write the expression $A(x) \cdot B(x) - 3C(x)$ as a polynomial in standard form.
- $$A(x) = x^3 + 2x - 1$$
- $$B(x) = x^2 + 7$$
- $$C(x) = x^4 - 5x$$
- 17 A company calculates its profit by finding the difference between revenue and cost. The cost function of producing x hammers is $C(x) = 4x + 170$. If each hammer is sold for \$10, the revenue function for selling x hammers is $R(x) = 10x$. How many hammers must be sold to make a profit? How many hammers must be sold to make a profit of \$100?

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Answer Section

1 ANS: 3

$$x^2 - 6x + 9 - (x^2 + 6x + 9) = -12x$$

REF: 062210aai

2 ANS: 4 REF: 081803aai

3 ANS: 4

$$\frac{m(c)}{g(c)} = \frac{c+1}{1-c^2} = \frac{c+1}{(1+c)(1-c)} = \frac{1}{1-c}$$

REF: 061608aai

4 ANS: 3 REF: 011710aai

5 ANS: 1

$$\frac{f(x)}{g(x)} = \frac{2x^2 + 7x - 15}{3 - 2x} = \frac{(2x-3)(x+5)}{-(2x-3)} = \frac{x+5}{-1} = -x - 5$$

REF: 012412aai

6 ANS: 2

$$V(x) = x(18-2x)(18-2x) = x(324-72x+4x^2) = 324x - 72x^2 + 4x^3$$

REF: 082418aai

7 ANS: 3 REF: 012002aai

8 ANS: 3

$$\begin{aligned} P(x) &= R(x) - C(x) \\ &= 35x - (20x + 500) \\ &= 15x - 500 \end{aligned}$$

REF: 010220b

9 ANS: 2

$$P(x) = -0.5x^2 + 800x - 100 - (300x + 250) = -0.5x^2 + 500x - 350$$

REF: 081406ai

10 ANS: 3

$$95.4x - 6x^2 - (0.18x^3 + 0.02x^2 + 4x + 180)$$

REF: 082322aai

11 ANS: 2

$$\begin{aligned} x(30 - 0.01x) - (0.15x^3 + 0.01x^2 + 2x + 120) &= 30x - 0.01x^2 - 0.15x^3 - 0.01x^2 - 2x - 120 \\ &= -0.15x^3 - 0.02x^2 + 28x - 120 \end{aligned}$$

REF: 061709aai

12 ANS: 1

$$p(x) = r(x) - c(x)$$

$$-0.5x^2 + 250x - 300 = -0.3x^2 + 150x - c(x)$$

$$c(x) = 0.2x^2 - 100x + 300$$

REF: 061813aaii

13 ANS: 3

$$p(x) = r(x) - c(x)$$

$$-15x^2 + 600x + 60 = -0.4x^2 + 130x + 1200 - c(x)$$

$$c(x) = 14.6x^2 - 470x + 1140$$

REF: 062421aaii

14 ANS:

$$g(x) = 2(2x + 1)^2 - 1 = 2(4x^2 + 4x + 1) - 1 = 8x^2 + 8x + 2 - 1 = 8x^2 + 8x + 1$$

REF: 061625ai

15 ANS:

$$(2x^2 + x - 3) \cdot (x - 1) - \left[(2x^2 + x - 3) + (x - 1) \right]$$

$$(2x^3 - 2x^2 + x^2 - x - 3x + 3) - (2x^2 + 2x - 4)$$

$$2x^3 - 3x^2 - 6x + 7$$

REF: 011833aaii

16 ANS:

$$(x^3 + 2x - 1)(x^2 + 7) - 3(x^4 - 5x)$$

$$x^5 + 7x^3 + 2x^3 + 14x - x^2 - 7 - 3x^4 + 15x$$

$$x^5 - 3x^4 + 9x^3 - x^2 + 29x - 7$$

REF: 012330aaii

17 ANS:

$$R(x) = C(x)$$

29, 45. $10x = 4x + 170$. If you round down to 28 hammers, the company does not make a profit. Round up to

$$x = 28.3$$

$$R(x) - C(x) = 100$$

29. To make a profit of \$100, $10x - (4x + 170) = 100$

$$6x - 170 = 100$$

$$x = 45$$

REF: 080332b