Equivalent Expressions

CollegeBoard Question Bank

Abstract

This exercise sheet contains

- an **Easy** category with 19 questions;
- a **Medium** category with 25 questions;
- a **Hard** category with 20 questions

for you to attempt. A digital copy of this sheet is available for you on moodle. Feel free to utilize the **Question Space** on Teams to ask for guidance.

Best,
Omar :)

Equivalent Expressions

Easy

(1) **72ebc024** MULTIPLE CHOICE One answer only

Which expression is equivalent to $16x^3y^2 + 14xy$?

a. $14xy\left(2x^2y + 1\right)$
b. $2xy\left(8x^2y + 7\right)$
c. $14xy\left(8x^2y + 1\right)$
d. $2xy(8xy + 7)$

(2) **e312081b** MULTIPLE CHOICE One answer only

$$(x + 5) + (2x - 3)$$

Which of the following is equivalent to the given expression?

a. $3x - 8$
b. $3x - 2$
c. $3x + 8$
d. $3x + 2$

(3) **4ac59df6** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which expression is equivalent to $(8yz)(y)(7z)$?

a. $56yz$
b. $56y^2z^2$
c. $56y^2z$
d. $16yz$

(4) **1d3fee25** MULTIPLE CHOICE | One answer only

Which of the following is equivalent to $3(x + 5) - 6$?

a. $3x + 9$
b. $15x - 6$
c. $3x - 3$
d. $3x - 1$

(5) **02489d55** MULTIPLE CHOICE   One answer only

Which expression is equivalent to $19\left(x^2 - 7\right)$?

a. $19x^2 - 7$
b. $19x^2 - 133$
c. $19x^2 - 26$
d. $19x^2 + 12$

(6) **60fdb4d4** | MULTIPLE CHOICE | | One answer only |

Which expression is equivalent to $(2x^2 - 4) - (-3x^2 + 2x - 7)$?

    a. $-x^2 + 2x - 11$
    b. $-x^2 - 2x - 11$
    c. $5x^2 - 2x + 3$
    d. $5x^2 + 2x - 3$

(7) **49efde89** MULTIPLE CHOICE | One answer only

The expression $2x^2 + ax$ is equivalent to $x(2x + 7)$ for some constant a. What is the value of a ?

   a. 7
   b. 4
   c. 3
   d. 2

(8) **9ed9f54d** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following is equivalent to $2\left(x^2 - x\right) + 3\left(x^2 - x\right)$?

a. $5x^2 + 5x$
b. $5x$
c. $5x^2 - 5x$
d. $5x^2$

(9) **294db8ec** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following is equivalent to $2x^3 + 4$?

a. $2\left(x^3 + 2\right)$
b. $2\left(x^3 + 4\right)$
c. $4\left(x^3 + 4\right)$
d. $4\left(x^3 + 2\right)$

(10) **bdb0aa23** MULTIPLE CHOICE   One answer only

Which expression is equivalent to $5x^5 - 6x^4 + 8x^3$?

a. $x^4(5x - 6)$
b. $6x^5 \left(-6x^4 + 8x^3 + 1\right)$
c. $8x^3 \left(5x^2 - 6x + 1\right)$
d. $x^3 \left(5x^2 - 6x + 8\right)$

(11) **6e06a0a7** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following expressions is equivalent to $2a^2(a+3)$?

    a. $5a^3$
    b. $2a^3 + 3$
    c. $8a^5$
    d. $2a^3 + 6a^2$

(12) **df0ef054**

$$\left(2x^3 + 3x\right)\left(x^3 - 2x\right)$$

Which of the following is equivalent to the expression above?

a. $3x^3 + x$
b. $x^3 + 5x$
c. $2x^6 - x^4 - 6x^2$
d. $3x^6 - x^4 - 6x^2$

(13) **fb96a5b3** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following expressions is equivalent to $2(ab - 3) + 2$?

    a. $2ab - 8$
    b. $2ab - 1$
    c. $2ab - 4$
    d. $2ab - 5$

(14) **df747160** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which expression is equivalent to $17\left(x^2 - 100y^2\right)$?

    a. $17(x - 2y)(x + 50y)$
    b. $17(x - 10y)(x - 10y)$
    c. $17(x - 10y)(x + 10y)$
    d. $17(x - 2y)(x - 50y)$

(15) **e597050f** MULTIPLE CHOICE   One answer only

Which expression is equivalent to $9x + 6x + 2y + 3y$?

    a. $3x + 5y$
    b. $15x + 5y$
    c. $6x + 8y$
    d. $12x + 8y$

(16) **5dd53f73** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which expression is equivalent to $34x + 34y$?

    a. $34(x + y)$
    b. $34xy$
    c. $68x$
    d. $68y$

(17) **0354c7de** MULTIPLE CHOICE   One answer only

$$5x + 15$$

Which of the following is equivalent to the given expression?

a. $5(x + 20)$
b. $5(x + 10)$
c. $5(x + 15)$
d. $5(x + 3)$

(18) **974d33dc**

Which of the following expressions is equivalent to the sum of $(r^3 + 5r^2 + 7)$ and $(r^2 + 8r + 12)$?

    a. $r^3 + 6r^2 + 8r + 19$
    b. $r^5 + 13r^3 + 19$
    c. $r^3 + 5r^2 + 7r + 12$
    d. $2r^3 + 13r^2 + 19$

(19) **d4d513ff** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which expression is equivalent to $12x + 27$?

    a. $27(12x + 1)$
    b. $3(4x + 9)$
    c. $12(9x + 1)$
    d. $3(9x + 24)$

Medium

(1) **dd4ab4c4** [MULTIPLE CHOICE] [One answer only]

$$4a^2 + 20ab + 25b^2$$

Which of the following is a factor of the polynomial above?

a. $2a + 5b$
b. $4a + 5b$
c. $4a + 25b$
d. $a + b$

(2) **b8caaf84** ☐ MULTIPLE CHOICE | One answer only

If $p = 3x + 4$ and $v = x + 5$, which of the following is equivalent to $pv - 2p + v$?

    a. $3x^2 + 12x + 7$
    b. $3x^2 + 19x + 20$
    c. $3x^2 + 14x + 17$
    d. $3x^2 + 26x + 33$

(3) **ad2ec615**

Which of the following is equivalent to the expression $x^4 - x^2 - 6$?

a. $(x^2 + 3)(x^2 - 2)$
b. $(x^2 + 2)(x^2 - 3)$
c. $(x^2 + 1)(x^2 - 6)$
d. $(x^2 + 6)(x^2 - 1)$

(4) **42c71eb5** MULTIPLE CHOICE One answer only

$$(2x + 5)^2 - (x - 2) + 2(x + 3)$$

Which of the following is equivalent to the expression above?

a. $4x^2 + x + 33$
b. $4x^2 + x + 29$
c. $4x^2 + 21x + 29$
d. $4x^2 + 21x + 33$

(5) **a05bd3a4** MULTIPLE CHOICE   One answer only

Which of the following expressions is equivalent to $x^2 - 5$?

a. $(x + \sqrt{5})^2$
b. $(x - \sqrt{5})^2$
c. $(x + \sqrt{5})(x - \sqrt{5})$
d. $(x + 5)(x - 1)$

(6) **3206b905** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following expressions is equivalent to $8x^{10} - 8x^9 + 88x$?

a. $x\left(8^{10} - 8^9 + 88\right)$
b. $8x\left(x^{10} - x^9 + 11x\right)$
c. $8x\left(x^9 - x^8 + 11\right)$
d. $x\left(7x^{10} - 7x^9 + 87x\right)$

(7) **cc776a04** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following is an equivalent form of $(1.5x-2.4)^2-(5.2x^2 - 6.4)$?

    a. $-2.2x^2 + 1.6$
    b. $-2.95x^2 - 7.2x + 0.64$
    c. $-2.2x^2 + 11.2$
    d. $-2.95x^2 - 7.2x + 12.16$

$$g(x) = \frac{3}{5}x + \frac{7}{6} \qquad h(x) = 6x - 5$$

The functions g and h are defined by the equations shown. Which expression is equivalent to $g(x) \cdot h(x)$?

a. $\frac{18x^2}{5} - \frac{35}{6}$

b. $\frac{18x^2}{5} + \frac{27x}{11} - \frac{35}{6}$

c. $\frac{18x^2}{5} + 4x - \frac{35}{6}$

d. $\frac{18x^2}{5} - 4x - \frac{35}{6}$

(9) **a520ba07** MULTIPLE CHOICE   One answer only

$$\sqrt[3]{x^3 y^6}$$

Which of the following expressions is equivalent to the expression above?

a. y^3
b. xy^2
c. y^2
d. xy^3

(10) **a255ae72** MULTIPLE CHOICE   One answer only

If $x^2 = a+b$ and $y^2 = a+c$, which of the following is equal to $(x^2 - y^2)^2$?

    a. $b^2 - 2bc + c^2$
    b. $4a^2 - 2abc + b^2c^2$
    c. $a^2 - 2ac + c^2$
    d. $4a^2 - 4abc + c^2$

(11) **463eec13** MULTIPLE CHOICE   One answer only

If $x \neq 0$, which of the following expressions is equivalent to $\dfrac{\sqrt{16x^4y^8}}{x^3}$?

a. $4x^{-2}y^2$
b. $4xy^4$
c. $8x^2y^4$
d. $4x^{-1}y^4$

(12) **a1bf1c4e** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

$$x^2 + 6x + 4$$

Which of the following is equivalent to the expression above?

a. $(x - 3)^2 - 5$
b. $(x + 3)^2 - 5$
c. $(x + 3)^2 + 5$
d. $(x - 3)^2 + 5$

(13) **f237ccfc** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

The sum of $-2x^2 + x + 31$ and $3x^2 + 7x - 8$ can be written in the form $ax^2 + bx + c$, where a, b, and c are constants. What is the value of $a + b + c$?

$$\left(\frac{1}{2}x + \frac{3}{2}\right)\left(\frac{3}{2}x + \frac{1}{2}\right)$$

The expression above is equivalent to $ax^2 + bx + c$, where a, b, and c are constants. What is the value of b ?

(15) **482a445b** [MULTIPLE CHOICE] [One answer only]

Which expression is equivalent to $(x^2 + 11)^2 + (x - 5)(x + 5)$?

    a. $x^4 + x^2 + 146$
    b. $x^4 + 23x^2 + 96$
    c. $x^4 + 12x^2 + 121$
    d. $x^4 + 23x^2 - 14$

(16) **24016dee** MULTIPLE CHOICE   One answer only

Which expression is equivalent to $(8x^3 + 8) - (x^3 - 2)$?

    a. $7x^3 + 6$
    b. $8x^3 + 10$
    c. $7x^3 + 10$
    d. $8x^3 + 6$

(17) **c3a72da5** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

Which of the following is equivalent to the sum of $3x^4 + 2x^3$ and $4x^4 + 7x^3$?

    a. $12x^4 + 14x^3$
    b. $7x^4 + 9x^3$
    c. $16x^{14}$
    d. $7x^8 + 9x^6$

(18) **16de54c7** SHORT ANSWER   Case-Insensitive

$$2x^2 + 5x - 12$$

If the given expression is rewritten in the form $(2x - 3)(x + k)$, where k is a constant, what is the value of k ?

(19) **d9137a84** MULTIPLE CHOICE   One answer only

Which expression represents the product of $(x^{-6}y^3z^5)$ and $(x^4z^5 + y^8z^{-7})$?

a. $x^{-2}y^3z^{10} + y^8z^{-7}$
b. $x^{-2}z^{10} + y^{11}z^{-2}$
c. $x^{-2}z^{10} + x^{-6}z^{-2}$
d. $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$

(20) **3e9cc0c2** | MULTIPLE CHOICE | | One answer only |

Which of the following is equivalent to $(1-p)\left(1 + p + p^2 + p^3 + p^4 + p^5 + p^6\right)$?

    a. $1 - p^8$
    b. $1 - p^5$
    c. $1 - p^6$
    d. $1 - p^7$

(21) **7348f046** MULTIPLE CHOICE | One answer only

$$(2x + 3) - (x - 7)$$

Which of the following is equivalent to the given expression?

a. $3x - 4$
b. $x + 10$
c. $2x^2 + 21$
d. $x - 4$

(22) **b47419f4** MULTIPLE CHOICE | One answer only

$$\left(\frac{1}{2}x + 3\right) - \left(\frac{2}{3}x - 5\right)$$

Which of the following is equivalent to the expression above?

a. $-\frac{1}{6}x + 8$
b. $-\frac{1}{3}x^2 + \frac{1}{2}x + 15$
c. $-\frac{1}{3}x^2 - \frac{9}{2}x - 15$
d. $-\frac{1}{6}x - 2$

(23) **8838a672** [MULTIPLE CHOICE] [One answer only]

$$\left(4x^3 - 5x^2 + 3\right) - \left(6x^3 + 2x^2 - x\right)$$

Which of the following expressions is equivalent to the expression above?

a. $10x^3 - 7x^2 - x + 3$
b. $-2x^3 - 7x^2 + x + 3$
c. $-2x^3 - 3x^2 + x + 3$
d. $-10x^3 - 3x^2 + x + 3$

(24) **0b3d25c5** MULTIPLE CHOICE   One answer only

Which of the following is equivalent to $\sqrt[4]{x^2 + 8x + 16}$, where $x > 0$?

a.

b. $(x + 4)^4$

c. $(x + 4)^2$

d. $(x + 4)(x + 4)^{\frac{1}{2}}$

(25) **c602140f** [MULTIPLE CHOICE] [One answer only]

$$(x - 11y)(2x - 3y) - 12y(-2x + 3y)$$

Which of the following is equivalent to the expression above?

a. $x - 23y$
b. $2x^2 + 24xy + 36y^2$
c. $2x^2 - xy - 3y^2$
d. $2x^2 - 49xy + 69y^2$

Hard

(1) **371cbf6b** `MULTIPLE CHOICE` `One answer only`

$$(ax + 3)\left(5x^2 - bx + 4\right) = 20x^3 - 9x^2 - 2x + 12$$

The equation above is true for all x, where a and b are constants. What is the value of ab ?

    a. 20
    b. 40
    c. 24
    d. 18

(2) **40c09d66** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

If $\frac{\sqrt{x^5}}{\sqrt[3]{x^4}} = x^{\frac{a}{b}}$ for all positive values of x, what is the value of $\frac{a}{b}$?

(3) **34847f8a** MULTIPLE CHOICE   One answer only

$$\frac{2}{x-2} + \frac{3}{x+5} = \frac{rx+t}{(x-2)(x+5)}$$

The equation above is true for all $x > 2$, where r and t are positive constants. What is the value of rt ?

    a. 60
    b. 15
    c. 20
    d. -20

(4) **137cc6fd**

$$\sqrt[5]{70n}(\sqrt[6]{70n})^2$$

For what value of x is the given expression equivalent to $(70n)^{30x}$, where $n > 1$?

(5) **ea6d05bb** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

The expression $(3x - 23)(19x + 6)$ is equivalent to the expression $ax^2 + bx + c$, where a, b, and c are constants. What is the value of b ?

(6) **d8789a4c** [MULTIPLE CHOICE] [One answer only]

$$\frac{x^2 - c}{x - b}$$

In the expression above, b and c are positive integers. If the expression is equivalent to $x + b$ and $x \neq b$, which of the following could be the value of c ?

   a. 6
   b. 4
   c. 8
   d. 10

(7) **5355c0ef** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

$$0.36x^2 + 0.63x + 1.17$$

The given expression can be rewritten as $a\left(4x^2 + 7x + 13\right)$, where a is a constant. What is the value of a ?

(8) **c81b6c57** MULTIPLE CHOICE   One answer only

In the expression $3\left(2x^2 + px + 8\right) - 16x(p + 4), p$ is a constant. This expression is equivalent to the expression $6x^2 - 155x + 24$. What is the value of p ?

    a. 13
    b. 7
    c. -3
    d. 155

(9) **967ef685** MULTIPLE CHOICE   One answer only

Which expression is equivalent to $\frac{42a}{k} + 42ak$, where $k > 0$?

a. $\frac{84a}{k}$

b. $\frac{84ak^2}{k}$

c. $\frac{42a\left(k^2+1\right)}{k}$

d. $\frac{42a(k+1)}{k}$

(10) **2c88af4d** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

The expression $\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$, where $x > 1$ and $y > 1$, is equivalent to which of the following?

a. $\dfrac{y\sqrt{y}}{\sqrt[3]{x^2}}$

b. $\dfrac{\sqrt{y}}{\sqrt[3]{x^2}}$

c. $\dfrac{y\sqrt{y}}{x\sqrt{x}}$

d. $\dfrac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

(11) **22fd3e1f**

$$f(x) = x^3 - 9x$$
$$g(x) = x^2 - 2x - 3$$

Which of the following expressions is equivalent to $\frac{f(x)}{g(x)}$, for $x>3$?

a. $\frac{1}{x+1}$
b. $\frac{x+3}{x+1}$
c. $\frac{x(x+3)}{x+1}$
d. $\frac{x(x-3)}{x+1}$

(12) **a0b4103e** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

The expression $\frac{1}{3}x^2 - 2$ can be rewritten as $\frac{1}{3}(x-k)(x+k)$, where k is a positive constant. What is the value of k ?

   a. $\sqrt{6}$
   b. $\sqrt{2}$
   c. 6
   d. 2

(13) **c6e85cd7** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

If $4^{8c} = \sqrt[3]{4^7}$, what is the value of c ?

(14) **ad038c19** MULTIPLE CHOICE One answer only

Which of the following is equivalent to $\left(a + \frac{b}{2}\right)^2$?

a. $a^2 + ab + \frac{b^2}{4}$

b. $a^2 + \frac{b^2}{4}$

c. $a^2 + \frac{b^2}{2}$

d. $a^2 + \frac{ab}{2} + \frac{b^2}{2}$

(15) **12e7faf8** MULTIPLE CHOICE   One answer only

The equation $\frac{x^2+6x-7}{x+7} = ax + d$ is true for all $x \neq -7$, where a and d are integers. What is the value of $a + d$?

    a. -6
    b. 0
    c. 1
    d. -1

(16) **89fc23af** | MULTIPLE CHOICE | One answer only |

Which of the following expressions is equivalent to $\frac{x^2-2x-5}{x-3}$?

a. $x + 1 - \frac{2}{x-3}$

b. $x - 5 - \frac{20}{x-3}$

c. $x - 5 - \frac{10}{x-3}$

d. $x + 1 - \frac{8}{x-3}$

(17) **911c415b** $\boxed{\text{SHORT ANSWER}}$ $\boxed{\text{Case-Insensitive}}$

$$\left(7532 + 100y^2\right) + 10\left(10y^2 - 110\right)$$

The expression above can be written in the form $ay^2 + b$, where a and b are constants. What is the value of $a + b$?

(18) **f89e1d6f** ┃MULTIPLE CHOICE┃ ⟨One answer only⟩

If $a = c + d$, which of the following is equivalent to the expression $x^2 - c^2 - 2cd - d^2$?

    a. $(x + a)(x - a)$
    b. $(x - a)^2$
    c. $(x + a)^2$
    d. $x^2 - ax - a^2$

(19) **e117d3b8** | MULTIPLE CHOICE | | One answer only |

If a and c are positive numbers, which of the following is equivalent to $\sqrt{(a+c)^3} \cdot \sqrt{a+c}$?

  a. $a + c$
  b. $a^2 + c^2$
  c. $a^2 + 2ac + c^2$
  d. $a^2 c^2$

(20) **7355b9d9** $\boxed{\text{MULTIPLE CHOICE}}$ $\boxed{\text{One answer only}}$

If $k - x$ is a factor of the expression $-x^2 + \frac{1}{29}nk^2$, where n and k are constants and $k > 0$, what is the value of n ?

   a. $-\frac{1}{29}$
   b. $\frac{1}{29}$
   c. 29
   d. -29

Total of marks: 64