

Question ID 7f4b32e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 7f4b32e1

$$\begin{aligned}g(x) &= \frac{3}{5}x + \frac{7}{6} \\ h(x) &= 6x - 5\end{aligned}$$

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

ID: 7f4b32e1 Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that $gx = \frac{3}{5}x + \frac{7}{6}$ and $hx = 6x - 5$. Substituting $\frac{3}{5}x + \frac{7}{6}$ for gx and $6x - 5$ for hx in the expression $gx \cdot hx$ yields $\frac{3}{5}x + \frac{7}{6}6x - 5$. This expression can be rewritten as $\frac{3}{5}x6x - 5 + \frac{7}{6}6x - 5$, or $\frac{18x^2}{5} - 3x + 7x - \frac{35}{6}$, which is equivalent to $\frac{18x^2}{5} + 4x - \frac{35}{6}$.

Choice A is incorrect. This expression is equivalent to $\frac{3}{5}x6x + \frac{7}{6}-5$, not $\frac{3}{5}x + \frac{7}{6}6x - 5$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This expression is equivalent to $\frac{3}{5}x - \frac{7}{6}6x + 5$, not $\frac{3}{5}x + \frac{7}{6}6x - 5$.

Question Difficulty: Medium

Question ID bc68d9f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: bc68d9f9

Which expression is equivalent to $6x^8y^2 + 12x^2y^2$?

- A. $6x^2y^2(2x^6)$
- B. $6x^2y^2(x^4)$
- C. $6x^2y^2(x^6 + 2)$
- D. $6x^2y^2(x^4 + 2)$

ID: bc68d9f9 Answer

Correct Answer: C

Rationale

Choice C is correct. Since each term of the given expression has a common factor of $6x^2y^2$, it may be rewritten as $6x^2y^2(x^6) + 6x^2y^2(2)$, or $6x^2y^2(x^6 + 2)$.

Choice A is incorrect. This expression is equivalent to $12x^8y^2$, not $6x^8y^2 + 12x^2y^2$.

Choice B is incorrect. This expression is equivalent to $6x^6y^2$, not $6x^8y^2 + 12x^2y^2$.

Choice D is incorrect. This expression is equivalent to $6x^6y^2 + 12x^2y^2$, not $6x^8y^2 + 12x^2y^2$.

Question Difficulty: Medium

Question ID eb385faa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: eb385faa

Which expression is equivalent to $(7x^3 + 7x) - (6x^3 - 3x)$?

- A. $x^3 + 10x$
- B. $-13x^3 + 10x$
- C. $-13x^3 + 4x$
- D. $x^3 + 4x$

ID: eb385faa Answer

Correct Answer: A

Rationale

Choice A is correct. Applying the distributive property, the given expression can be written as $7x^3 + 7x - 6x^3 + 3x$. Grouping like terms in this expression yields $7x^3 - 6x^3 + 7x + 3x$. Combining like terms in this expression yields $x^3 + 10x$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 219a57aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 219a57aa

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

- A. $x^{-2}z^{10} + y^{11}z^{-2}$
- B. $x^{-2}z^{10} + x^{-6}z^{-2}$
- C. $x^{-2}y^3z^{10} + y^8z^{-7}$
- D. $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$

ID: 219a57aa Answer

Correct Answer: D

Rationale

Choice D is correct. The product of $x^{-6}y^3z^5$ and $x^4z^5 + y^8z^{-7}$ can be represented by the expression $x^{-6}y^3z^5x^4z^5 + y^8z^{-7}$. Applying the distributive property to this expression yields $x^{-6}y^3z^5x^4z^5 + x^{-6}y^3z^5y^8z^{-7}$, or $x^{-6}x^4y^3z^5z^5 + x^{-6}y^3y^8z^5z^{-7}$. This expression is equivalent to $x^{-6+4}y^3z^{5+5} + x^{-6}y^{3+8}z^{5-7}$, or $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 5e61ba73

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 5e61ba73

The expression $90y^5 - 54y^4$ is equivalent to $ry^4(15y - 9)$, where r is a constant. What is the value of r ?

ID: 5e61ba73 Answer

Correct Answer: 6

Rationale

The correct answer is 6. Applying the distributive property to the expression $ry^4(15y - 9)$ yields $15ry^5 - 9ry^4$. Since $90y^5 - 54y^4$ is equivalent to $ry^4(15y - 9)$, it follows that $90y^5 - 54y^4$ is also equivalent to $15ry^5 - 9ry^4$. Since these expressions are equivalent, it follows that corresponding coefficients are equivalent. Therefore, $90 = 15r$ and $-54 = -9r$. Solving either of these equations for r will yield the value of r . Dividing both sides of $90 = 15r$ by 15 yields $6 = r$. Therefore, the value of r is 6.

Question Difficulty: Medium

Question ID 01264050

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 01264050

Which expression is equivalent to $(d - 6)(8d^2 - 3)$?

- A. $8d^3 - 14d^2 - 3d + 18$
- B. $8d^3 - 17d^2 + 48$
- C. $8d^3 - 48d^2 - 3d + 18$
- D. $8d^3 - 51d^2 + 48$

ID: 01264050 Answer

Correct Answer: C

Rationale

Choice C is correct. Applying the distributive property to the given expression yields $d8d^2 - 3 - 68d^2 - 3$. Applying the distributive property once again to this expression yields $d8d^2 + d-3 + -68d^2 + -6-3$, or $8d^3 + -3d + -48d^2 + 18$. This expression can be rewritten as $8d^3 - 48d^2 - 3d + 18$. Thus, $d - 68d^2 - 3$ is equivalent to $8d^3 - 48d^2 - 3d + 18$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 581be4a1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 581be4a1

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

- A. $x(7x^{10} - 7x^9 + 87x)$
- B. $x(8^{10} - 8^9 + 88)$
- C. $8x(x^{10} - x^9 + 11x)$
- D. $8x(x^9 - x^8 + 11)$

ID: 581be4a1 Answer

Correct Answer: D

Rationale

Choice D is correct. Since $8x$ is a common factor of each term in the given expression, the expression can be rewritten as $8xx^9 - x^8 + 11$.

Choice A is incorrect. This expression is equivalent to $7x^{11} - 7x^{10} + 87x^2$.

Choice B is incorrect. This expression is equivalent to $8^{10}x - 8^9x + 88x$.

Choice C is incorrect. This expression is equivalent to $8x^{11} - 8x^{10} + 88x^2$.

Question Difficulty: Medium

Question ID 3a7aa34d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 3a7aa34d

Which expression is equivalent to $a^{\frac{11}{12}}$, where $a > 0$?

- A. $\sqrt[12]{a^{132}}$
- B. $\sqrt[144]{a^{132}}$
- C. $\sqrt[121]{a^{132}}$
- D. $\sqrt[11]{a^{132}}$

ID: 3a7aa34d Answer

Correct Answer: B

Rationale

Choice B is correct. Since $\frac{12}{12} = 1$, multiplying the exponent of the given expression by $\frac{12}{12}$ yields an equivalent expression: $a^{\frac{11}{12} \cdot \frac{12}{12}} = a^{\frac{132}{144}}$. Since $\frac{132}{144} = 132 \cdot \frac{1}{144}$, the expression $a^{\frac{132}{144}}$ can be rewritten as $a^{132 \cdot \frac{1}{144}}$. Applying properties of exponents, this expression can be rewritten as $a^{132 \cdot \frac{1}{144}}$. An expression of the form $m^{\frac{1}{k}}$, where $m > 0$ and $k > 0$, is equivalent to $\sqrt[k]{m}$. Therefore, $a^{132 \cdot \frac{1}{144}}$ is equivalent to $\sqrt[144]{a^{132}}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID a351b98d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: a351b98d

The expression $\frac{24}{6x+42}$ is equivalent to $\frac{4}{x+b}$, where b is a constant and $x > 0$. What is the value of b ?

- A. 7
- B. 10
- C. 24
- D. 252

ID: a351b98d Answer

Correct Answer: A

Rationale

Choice A is correct. Since the given expressions are equivalent and the numerator of the second expression is $\frac{1}{6}$ of the numerator of the first expression, the denominator of the second expression must also be $\frac{1}{6}$ of the denominator of the first expression. By the distributive property, $\frac{1}{6}6x + 42$ is equivalent to $\frac{1}{6}6x + \frac{1}{6}42$, or $x + 7$. Therefore, the value of b is 7.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 5883daba

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 5883daba

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

- A. $8x^3 + 6$
- B. $7x^3 + 10$
- C. $8x^3 + 10$
- D. $7x^3 + 6$

ID: 5883daba Answer

Correct Answer: B

Rationale

Choice B is correct. The given expression is equivalent to $8x^3 + 8 - x^3 - -2$, or $8x^3 + 8 - x^3 + 2$. Combining like terms in this expression yields $7x^3 + 10$.

Choice A is incorrect. This expression is equivalent to $8x^3 + 8 - 2$, not $8x^3 + 8 - x^3 - 2$.

Choice C is incorrect. This expression is equivalent to $8x^3 + 8 - -2$, not $8x^3 + 8 - x^3 - 2$.

Choice D is incorrect. This expression is equivalent to $8x^3 + 8 - x^3 + 2$, not $8x^3 + 8 - x^3 - 2$.

Question Difficulty: Medium

Question ID 27b93ec4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 27b93ec4

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

- A. $x^4 + 23x^2 - 14$
- B. $x^4 + 23x^2 + 96$
- C. $x^4 + 12x^2 + 121$
- D. $x^4 + x^2 + 146$

ID: 27b93ec4 Answer

Correct Answer: B

Rationale

Choice B is correct. The expression $x^2 + 11^2$ can be written as $x^2 + 11x^2 + 11$, which is equivalent to $x^2x^2 + 11 + 11x^2 + 11$. Distributing x^2 and 11 to $x^2 + 11$ yields $x^4 + 11x^2 + 11x^2 + 121$, or $x^4 + 22x^2 + 121$. The expression $x - 5x + 5$ is equivalent to $x - 5x + x - 55$. Distributing x and 5 to $x - 5$ yields $x^2 - 5x + 5x - 25$, or $x^2 - 25$. Therefore, the expression $x^2 + 11^2 + x - 5x + 5$ is equivalent to $x^4 + 22x^2 + 121 + x^2 - 25$, or $x^4 + 22x^2 + 121 + x^2 - 25$. Combining like terms in this expression yields $x^4 + 23x^2 + 96$.

Choice A is incorrect. Equivalent expressions must be equivalent for any value of x . Substituting 0 for x in this expression yields -14, whereas substituting 0 for x in the given expression yields 96.

Choice C is incorrect. Equivalent expressions must be equivalent for any value of x . Substituting 0 for x in this expression yields 121, whereas substituting 0 for x in the given expression yields 96.

Choice D is incorrect. Equivalent expressions must be equivalent for any value of x . Substituting 0 for x in this expression yields 146, whereas substituting 0 for x in the given expression yields 96.

Question Difficulty: Medium

Question ID ce53810c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: ce53810c

Which expression is equivalent to $\frac{h^{15}q^7}{h^5q^{21}}$, where $h > 0$ and $q > 0$?

- A. $\frac{h^{10}}{q^{14}}$
- B. $\frac{h^3}{q^3}$
- C. $h^{10}q^{14}$
- D. h^3q^3

ID: ce53810c Answer

Correct Answer: A

Rationale

Choice A is correct. For positive values of a , $\frac{a^m}{a^n} = a^{m-n}$, where m and n are integers. Since it's given that $h > 0$ and $q > 0$, this property can be applied to rewrite the given expression as $h^{15-5}q^{7-21}$, which is equivalent to $h^{10}q^{-14}$. For positive values of a , $a^{-n} = \frac{1}{a^n}$. This property can be applied to rewrite the expression $h^{10}q^{-14}$ as $h^{10}\frac{1}{q^{14}}$, which is equivalent to $\frac{h^{10}}{q^{14}}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID f8a698f7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: f8a698f7

$$(5x^3 - 3) - (-4x^3 + 8)$$

The given expression is equivalent to $bx^3 - 11$, where b is a constant. What is the value of b ?

ID: f8a698f7 Answer

Correct Answer: 9

Rationale

The correct answer is 9. The given expression can be rewritten as $5x^3 - 3 + -1-4x^3 + 8$. By applying the distributive property, this expression can be rewritten as $5x^3 - 3 + 4x^3 + -8$, which is equivalent to $5x^3 + 4x^3 + -3 + -8$. Adding like terms in this expression yields $9x^3 - 11$. Since it's given that $5x^3 - 3 - -4x^3 + 8$ is equivalent to $bx^3 - 11$, it follows that $9x^3 - 11$ is equivalent to $bx^3 - 11$. Therefore, the coefficients of x^3 in these two expressions must be equivalent, and the value of b must be 9.

Question Difficulty: Medium

Question ID 91f6f890

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: 91f6f890

Which expression is equivalent to $\sqrt[7]{x^9y^9}$, where x and y are positive?

- A. $(xy)^{\frac{7}{9}}$
- B. $(xy)^{\frac{9}{7}}$
- C. $(xy)^{16}$
- D. $(xy)^{63}$

ID: 91f6f890 Answer

Correct Answer: B

Rationale

Choice B is correct. For positive values of a and b , $a^mb^m = ab^m$, $\sqrt[n]{a} = a^{\frac{1}{n}}$, and $a^{jk} = a^{jk}$. Therefore, the given expression, $\sqrt[7]{x^9y^9}$, can be rewritten as $\sqrt[7]{xy^9}$. This expression is equivalent to $xy^{9\frac{1}{7}}$, which can be rewritten as $xy^{9\cdot\frac{1}{7}}$, or $xy^{\frac{9}{7}}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID a65952d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: a65952d9

Which expression is equivalent to $\frac{8x(x-7)-3(x-7)}{2x-14}$, where $x > 7$?

- A. $\frac{x-7}{5}$
- B. $\frac{8x-3}{2}$
- C. $\frac{8x^2-3x-14}{2x-14}$
- D. $\frac{8x^2-3x-77}{2x-14}$

ID: a65952d9 Answer

Correct Answer: B

Rationale

Choice B is correct. The given expression has a common factor of 2 in the denominator, so the expression can be rewritten as $\frac{8xx-7-3x-7}{2x-7}$. The three terms in this expression have a common factor of $x-7$. Since it's given that $x > 7$, x can't be equal to 7, which means $x-7$ can't be equal to 0. Therefore, each term in the expression, $\frac{8xx-7-3x-7}{2x-7}$, can be divided by $x-7$, which gives $\frac{8x-3}{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID aeef182c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	Medium

ID: aeef182c

$$\begin{aligned}f(x) &= x^2 + bx \\ g(x) &= 9x^2 - 27x\end{aligned}$$

Functions f and g are given, and in function f , b is a constant. If $f(x) \cdot g(x) = 9x^4 - 26x^3 - 3x^2$, what is the value of b ?

- A. -26
- B. $-\frac{26}{9}$
- C. $\frac{1}{9}$
- D. 9

ID: aeef182c Answer

Correct Answer: C

Rationale

Choice C is correct. Multiplying the given functions f and g yields $fx \cdot gx = x^2 + bx9x^2 - 27x$. Applying the distributive property to the right-hand side of this equation yields $fx \cdot gx = x^29x^2 - 27x + bx9x^2 - 27x$. Applying the distributive property once again to the right-hand side of this equation yields $fx \cdot gx = x^29x^2 - x^227x + bx9x^2 - bx27x$, which is equivalent to $fx \cdot gx = 9x^4 - 27x^3 + 9bx^3 - 27bx^2$. Factoring out x^3 from the second and third terms yields $fx \cdot gx = 9x^4 + -27 + 9bx^3 - 27bx^2$. Since the left-hand sides of $fx \cdot gx = 9x^4 + -27 + 9bx^3 - 27bx^2$ and $fx \cdot gx = 9x^4 - 26x^3 - 3x^2$ are equal, it follows that $-27 + 9bx^3 = -26x^3$, or $-27 + 9b = -26$, and $-27bx^2 = -3x^2$, or $-27b = -3$. Adding 27 to each side of $-27 + 9b = -26$ yields $9b = 1$. Dividing each side of this equation by 9 yields $b = \frac{1}{9}$. Similarly, dividing each side of $-27b = -3$ by -27 yields $b = \frac{1}{9}$. Therefore, the value of b is $\frac{1}{9}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium