1. ë ¤ì ì¤ ê³ ì ° ê²°ê³¼ê° ë ë¨ì§ ë ·ê³¼ ë ¤ë¥¸ í ë ë ? (ë ¨, $a \neq 0$, $b \neq 0$) [배점 2, 하중]

① $a^4 \times a^4 \times a$ ② $a^{18} \div a^2$

③ $(a^3)^5 \div a^6$ ④ $(a^3b^2)^3 \div (b^3)^2$

⑤ $(a^3)^3$

해설

①, ③, ④, ⑤ : a^9

② : a^{16}

2. $a^3 \times b^x \times a^y \times b^4 = a^9b^{10}$ ì ¼ ë , $x - y$ ì ê° ì êµ¬í ì ¬ë ¼. [배점 2, 하중]

▶ 답 :

▷ 정답 : 0

해설

$a^{3+y}b^{x+4} = a^9b^{10}$

$3 + y = 9 \quad \therefore\ y = 6$

$x + 4 = 10 \quad \therefore\ x = 6$

$x = 6,\ y = 6$ ì ´ë¯ ë¡ $x - y = 0$ ì ´ë ¤.

3. $\left(\dfrac{a^2b^{\square}}{a^{\square}b^2}\right)^4 = \dfrac{b^8}{a^4}$ ì ì □ì ì ê³µí µì ì ¼ë¡ ë ¤ì ´ê° ì ë¥¼ êµ¬í ì ¬ë ¼. [배점 2, 하중]

▶ 답 :

▷ 정답 : 4

해설

$$\frac{b^8}{a^4} = \left(\frac{b^2}{a}\right)^4 = \left(\frac{a^3b^4}{a^4b^2}\right)^4 = \left(\frac{a^3b^{\square}}{a^{\square}b^2}\right)^4$$

4. $A = \dfrac{2x - y}{2}$, $B = \dfrac{x + 3y + 2}{3}$ ì ¼ ë , $A - \{2A - 3B - 3(A - 2B)\}$ ë¥¼ x , y ì ê´ í ì ì ¼ë¡ ë í ë ´ì ´ë ¼. [배점 2, 하중]

▶ 답 :

▷ 정답 : $x - 4y - 2$

해설

(ì¤ ì) $= A - (2A - 3B - 3A + 6B)$

$A - (-A + 3B) = 2A - 3B$

A , B ì ê° ì ë ì í ë©´

(ì¤ ì)$= 2x - y - (x + 3y + 2) = x - 4y - 2$

5. 5^5ì 25ë² ë í ì¬ ì »ì ê° ì 5ì ê±°ë -ì ê³±ì ¼ë¡ ë í ë ¸ ê² ì ? [배점 3, 하상]

① $5^5 + 25$ ② $5^5 \times 25$ ③ 5^7

④ $(5^5)^2$ ⑤ $(5^5)^{25}$

해설

$5^5 \times 25 = 5^5 \times 5^2 = 5^7$

6. ë ¤ì ì¤ ê³ì ° ê²°ê³¼ê° ab ê° ì ë ê² ì ?

[배점 3, 하상]

① $a^2b \times a^2b^3 \div a^3b^3$

② $(-a)^2 \div ab \times b^2$

③ $a^3b^4 \div (-a) \div (-ab^3)$

④ $ab^2 \times a^2b \div (-ab)^2$

⑤ $b \div a^3 \times a^4b$

해설

① $a^2b \times a^2b^3 \div a^3b^3 = a^2b \times a^2b^3 \times \dfrac{1}{a^3b^3} = ab$

② $(-a)^2 \div ab \times b^2 = a^2 \times \dfrac{1}{ab} \times b^2 = ab$

③ $a^3b^4 \div (-a) \div (-ab^3) = a^3b^4 \times \dfrac{1}{(-a)} \times \dfrac{1}{(-ab^3)} = ab$

④ $ab^2 \times a^2b \div (-ab)^2 = ab^2 \times a^2b \times \dfrac{1}{a^2b^2} = ab$

⑤ $b \div a^3 \times a^4b = b \times \left(\dfrac{1}{a}\right)^3 \times a^4b = ab^2$

7. ë ¤ì ì¤ ì ì ì³ì ê² ì ëª¨ë ê³ ë¥¸ê² ì ?

ë³´ê¸°

㉠ $(x^9)^2 \div (x^2)^3 = x^3$

㉡ $x^5 \times x^5 \times x^2 = x^{50}$

㉢ $x^{10} \div x^5 \div x^5 = 0$

㉣ $2^3 \div 2^x = \dfrac{1}{8}$ ì ¼ ë , $x = 6$

㉤ $2^{2+2} = a \times 2^2$ ì ¼ ë , $a = 4$

[배점 3, 하상]

① ㉢

② ㉠, ㉡, ㉢

③ ㉢, ㉣, ㉤

④ ㉣, ㉤

⑤ ㉠, ㉡, ㉢, ㉣

해설

㉠ $(x^9)^2 \div (x^2)^3 = x^9 \times 2 \div x^2 \times 3 = x^{18-6} = x^{12}$

㉡ $x^5 \times x^5 \times x^2 = x^{5+5+2} = x^{12}$

㉢ $x^{10} \div x^5 \div x^5 = x^{10-5-5} = x^0 = 1$

㉣ $2^3 \div 2^x = \dfrac{2^3}{2^x} = \dfrac{1}{2^3}$ $\therefore x = 6$

㉤ $2^{2+2} = 2^2 \times 2^2 = a \times 2^2$ $\therefore a = 4$

8. $(5x-6)(4x+3)$ ì ì ê° í ì ì ? [배점 3, 하상]

① $20x^2 + 2x - 18$

② $20x^2 + 4x - 18$

③ $20x^2 + 6x - 18$

④ $20x^2 - 9x + 18$

⑤ $20x^2 - 9x - 18$

해설

$(5x-6)(4x+3)=(5\times 4)x^2+\{5\times 3+(-6)\times 4\}x+(-6)\times 3=20x^2-9x-18$

9. $a=\frac{1}{2}$, $b=-\frac{2}{3}$, $c=-\frac{3}{4}$ ì ¼ ë , $\frac{a-b}{a+c}-ab+\frac{b}{c}$ ì ê° ì êµ¬í ë©´? [배점 3, 하상]

① $\frac{31}{9}$ ② $\frac{28}{9}$ ③ $-\frac{31}{3}$
④ $-\frac{31}{9}$ ⑤ $-\frac{28}{9}$

해설

$a-b=\frac{1}{2}-\left(\frac{-2}{3}\right)=\frac{7}{6}$

$a+c=\frac{1}{2}+\left(-\frac{3}{4}\right)=-\frac{1}{4}$

$ab=\frac{1}{2}\times\left(-\frac{2}{3}\right)=-\frac{1}{3}$

$\frac{b}{c}=\left(-\frac{2}{3}\right)\times\left(-\frac{4}{3}\right)=\frac{8}{9}$

$\therefore\ \frac{a-b}{a+c}-ab+\frac{b}{c}=\frac{\frac{7}{6}}{-\frac{1}{4}}-\left(-\frac{1}{3}\right)+\frac{8}{9}=-\frac{31}{9}$

10. ë ¤ì ì¤ ì ³ì ê² ì ? [배점 3, 중하]

① $4\times(-2)^3=32$

② $(-2)^2\times(-2)^2=-16$

③ $(-2)^2\times(-8)=-32$

④ $9\times 3^2=3^3$

⑤ $(-3)\times(-3)^3=-3^4$

해설

① $4\times(-2)^3=4\times(-8)=-32$
② $(-2)^2\times(-2)^2=(-2)^4=16$
③ $(-2)^2\times(-8)=4\times(-8)=-32$
④ $9\times 3^2=3^2\times 3^2=3^4$
⑤ $(-3)\times(-3)^3=(-3)^4=3^4$

11. ë ¤ì ì¤ ì ³ì ê² ì ? [배점 3, 중하]

① $(-1)^2\times(-1)^4=(-1)^8$

② $3^2\times 3^3=3^6$

③ $(-2)\times(-2)^3=(-2)^3$

④ $4^3\times 4^2=4^5$

⑤ $(-3)^2\times(-3)=3^2$

해설

① $(-1)^2\times(-1)^4=(-1)^{2+4}=(-1)^6$
② $3^2\times 3^3=3^{2+3}=3^5$
③ $(-2)\times(-2)^3=(-2)^{1+3}=(-2)^4$
⑤ $(-3)^2\times(-3)=3^{2+1}=3^3$

12. ë ¤ì $\square$ì ì ì ë§ì ì ë¥¼ì ¨ë £ì ´ë ¼.

$\left(-3x^{\square}y^2\right)^3=-27x^{12}y^{\square}$ [배점 3, 중하]

▶ 답 :

▶ 답 :

▷ 정답 : 4

▷ 정답 : 6

해설

$x^{3\times\square} = x^{12}$

$\therefore \square = 4$

$y^{2\times 3} = y^{\square}$

$\therefore \square = 6$

13. $2^{12} \times 5^{13}$ ì ëª ì ë¦¬ì ì ì¸§ êµ¬í ì ¬ë ¼.

[배점 3, 중하]

▶ 답 :

▷ 정답 : 13 ì ë¦¬ì ì

해설

$2^{12} \times 5^{13} = 2^{12} \times 5^{12} \times 5 = (2 \times 5)^{12} \times 5$

$= 10^{12} \times 5$

14. ë ¤ì ê³ ì ° ì¤ ì ³ì ê² ì ëª¨ë ê³ ë¥´ë©´?

[배점 3, 중하]

① $-(a-5b) = a+5b$

② $-x(-3x+y) = 3x^2 - xy$

③ $2x(3x-6) = 6x^2 - 6x$

④ $3x(2x-3y) - 2y(x+y) = 6x^2 - 11xy - 2y^2$

⑤ $-x(x-y+2) + 3y(2x+y+4) =$
$-x^2 + 7xy - 2x + 3y^2 + 12y$

해설

① $-(a-5b) = -a+5b$

③ $2x(3x-6) = 6x^2 - 12x$

15. ì ì a, b ì ë í ì ¬ $3x - 5y - \{y - 2(2x+3y)\} =$
$ax + by$ ì ¼ ë , $a+b$ ì ê° ì êµ¬í ì ¬ë ¼.

[배점 3, 중하]

▶ 답 :

▷ 정답 : 7

해설

$3x - 5y - \{y - 2(2x+3y)\}$

$= 3x - 5y - (y - 4x - 6y)$

$= 3x - 5y - (-4x - 5y)$

$= 3x - 5y + 4x + 5y$

$= 3x + 4x - 5y + 5y$

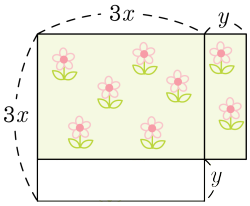
$= (3+4)x + (-5+5)y$

$= 7x$

ì ´ë¯ ë¡ $a = 7,\ b = 0$ ì ´ë ¤.

$\therefore\ a + b = 7 + 0 = 7$

16. ì ì§ì ´ë ¤ ê° ì¡±ì ë ¤ì ê·¸ë¦¼ê³¼ ê° ì ´ í ë³ì ê¸¸ì´ê° $3x$ m ì¸ ì ì¬ê° í ì ê½ë ë°-ì ê° ë¡ì ê¸¸ì´ë y m($3x > y$) ë ì ´ê³ , ì¸ë¡ì ê¸¸ì´ë y m ì¤ì¬ì ì ë¡ì´ ê½ë ë°-ì ë§ë ¤ê¸° í ì ë ¤. ê½ë ë°-ì ë ì ´ë ?



[배점 3, 중하]

① $9x^2 + 6xy + y^2(\mathrm{m}^2)$

② $9x^2 - 6xy + y^2(\mathrm{m}^2)$

③ $6x^2 - y^2(\mathrm{m}^2)$

④ $9x^2 - y^2(\mathrm{m}^2)$

⑤ $9x^2 + y^2(\mathrm{m}^2)$

해설

ë³ í ë ê½ë ë°-ì ê° ë¡ì ê¸¸ì´ë $3x + y(\mathrm{cm})$, ì¸ë¡ì ê¸¸ì´ë $3x - y(\mathrm{cm})$ ì ´ë ¤. ë °ë ¼ì ë³ í ë ê½ë ë°-ì ë ì ´ë $(3x + y)(3x - y) = 9x^2 - y^2(\mathrm{cm}^2)$ ì ´ë ¤.

17. $a : b = 3 : 2$ì ¼ ë , $\dfrac{3a^3b^3}{(-2a^2b)^2}$ì ê° ì êµ¬í ì ¬ë ¼.

[배점 4, 중중]

▶ 답 :

▷ 정답 : $\dfrac{1}{2}$

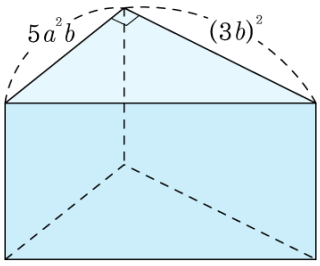
해설

(ì¤ ì) $= \dfrac{3a^3b^3}{4a^4b^2} = \dfrac{3b}{4a}$

$b = \dfrac{2}{3}a$

$\therefore \dfrac{3b}{4a} = \dfrac{2a}{4a} = \dfrac{1}{2}$

18. ë ¤ì ê · ¸ë¦¼ì ì ¼ê° ê¸°ë ¥ì ë¶ í ¼ê° $(3ab^2)^4$ì ¼ ë , ì ¼ê° ê¸°ë ¥ì ë ì ´ë ?



[배점 4, 중중]

① $\dfrac{9}{5}a^2b^5$ ② $\dfrac{27}{5}ab^6$ ③ $\dfrac{27}{10}a^2b^5$

④ $\dfrac{8}{15}ab^4$ ⑤ $\dfrac{18}{5}a^2b^5$

해설

(ì ¼ê° ê¸°ë ¥ì ë¶ í ¼) = (ë° ë©´ì ë ì ´) × (ë ì ´)

(ë° ë©´ì ë ì ´) $= \dfrac{1}{2} \times 5a^2b \times (3b)^2 = \dfrac{45a^2b^3}{2}$

ë ì ´ë¥¼ hë ¼ê³ í ë©´

$h = (3ab^2)^4 \times \dfrac{2}{45a^2b^3} = \dfrac{18}{5}a^2b^5$

19. ë ¤ì ì ì ê° ë ¨í í ë©´?

$(4a^2b - 8ab + 2b) \div (-2b) + (a^2x - ax) \div \frac{1}{3}x$

[배점 4, 중중]

① $a - 1$ ② $a^2 + a - 1$

③ $a^2 - 1$ ④ $a^2 - a$

⑤ $2a^2 + a - 1$

해설

$(4a^2b - 8ab + 2b) \div (-2b) + (a^2x - ax) \times \frac{3}{x}$

$= \frac{4a^2b - 8ab + 2b}{-2b} + \frac{3(a^2x - ax)}{x}$

$= -2a^2 + 4a - 1 + 3a^2 - 3a$

$= a^2 + a - 1$

20. $(8a^2b - 4ab^2) \div (-4b) + (3a - 2b) \times a + a \times (-3b)$ ì ¸ì ì ´ ì ë ¤. $a = -2$, $b = -3$ ì ¼ ë ì ì ê° ì ?

[배점 4, 중중]

① -26 ② -20 ③ -10

④ 4 ⑤ 20

해설

$(8a^2b - 4ab^2) \div (-4b) + (3a - 2b) \times a + a \times (-3b)$

$= \frac{8a^2b - 4ab^2}{-4b} + 3a^2 - 2ab - 3ab$

$= -2a^2 + ab + 3a^2 - 5ab$

$= a^2 - 4ab$

$= (-2)^2 - 4(-2)(-3)$

$= 4 - 24 = -20$

21. ë ¤ì ì¤ ì£¼ì ´ì§ ì ì ê³ì °ì ê° í ¸í ê² í ê¸° ì í ì ¬ ì ´ì ©í ì ì ë ê³±ì ê³µì ì ¼ë¡ ì ì í ì§ ì ì ê² ì ?

[배점 4, 중중]

① $91^2 \to (a+b)^2 = a^2 + 2ab + b^2$

② $597^2 \to (a-b)^2 = a^2 - 2ab + b^2$

③ $103^2 \to (a+b)^2 = a^2 + 2ab + b^2$

④ $84 \times 75 \to (a+b)(a-b) = a^2 - b^2$

⑤ $50.9 \times 49.1 \to (a+b)(a-b) = a^2 - b^2$

해설

④ $84 \times 75 = (80+4)(80-5)$

$(x+a)(x+b) = x^2 + (a+b)x + ab$

22. 4ê° ì ì a, b, c, dì ë í ì ¬ ê¸°í ¸ | |ë¥¼ $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$ë¡ ì ì í ë ¤.

ì ´ë , $\begin{vmatrix} x + 2y - 3 & -\frac{3}{2} \\ y - x + 1 & \frac{1}{2} \end{vmatrix}$ì ?

[배점 5, 중상]

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

③ $x + \frac{3}{2}y - 1$ ④ $-x + \frac{5}{2}y$

⑤ $-x + \frac{7}{2}y$

해설

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

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

$=\frac{1}{2}x+y-\frac{3}{2}+\frac{3}{2}y-\frac{3}{2}x+\frac{3}{2}$

$=-x+\frac{5}{2}y$

23. $-4a-\left\{3a+5b-2(a-2b-\square)\right\}=-a-11b$ ì ¼ ë , $\square$ì ì ì ë§ì ì ì ?

[배점 5, 중상]

① $-3b-2a$ ② $-b-4a$ ③ $b-2a$

④ $2a+3b$ ⑤ $3a+3b$

해설

$-4a-\left\{3a+5b-2(a-2b-\square)\right\}$

$=-4a-\left(3a+5b-2a+4b+2\square\right)$

$=-4a-3a-5b+2a-4b-2\square$

$=-5a-9b-2\square=-a-11b$

$\therefore\ \square=b-2a$

24. ì ì a, b, c, dì ë í ì¬ ë¤ì ë³´ê¸°ì ì $a+b-3c+3d$ì ê° ì êµ¬í ì¬ë ¼.

ë³´ê¸°

㉠ $x-[2x-(y-3x)-\{x-(3x-y)\}]=ax+by$

㉡ $5y-\left[2y-\frac{2}{3}(x-y)-\left\{\frac{5}{3}x-(x-4y)\right\}\right]=cx+dy$

[배점 5, 중상]

▶ 답 :

▷ 정답 : 11

해설

㉠ $x-[2x-(y-3x)-\{x-(3x-y)\}]$

$=x-\{2x-y+3x-(x-3x+y)\}$

$=x-\{2x+3x-y-(-2x+y)\}$

$=x-(5x-y+2x-y)$

$=x-(5x+2x-y-y)$

$=x-(7x-2y)$

$=x-7x+2y$

$=-6x+2y$

ì ´ë¯ ë¡ $a=-6$, $b=2$ì ´ë ¤.

㉡ $5y-\left[2y-\frac{2}{3}(x-y)-\left\{\frac{5}{3}x-(x-4y)\right\}\right]$

$=5y-\left\{2y-\frac{2}{3}x+\frac{2}{3}y-\left(\frac{5}{3}x-x+4y\right)\right\}$

$=5y-\left\{-\frac{2}{3}x+2y+\frac{2}{3}y-\left(\frac{2}{3}x+4y\right)\right\}$

$=5y-\left(-\frac{2}{3}x+\frac{8}{3}y-\frac{2}{3}x-4y\right)$

$=5y-\left(-\frac{4}{3}x-\frac{4}{3}y\right)$

$=5y+\frac{4}{3}x+\frac{4}{3}y$

$=\frac{4}{3}x+\frac{19}{3}y$

ì ´ë¯ ë¡ $c=\frac{4}{3}$, $d=\frac{19}{3}$ì ´ë ¤.

$\therefore\ a+b-3c+3d=-6+2-3\times\frac{4}{3}+3\times\frac{19}{3}=11$

25. $abc = 1$ ì ¼ ë , $\dfrac{a}{ab+a+1} + \dfrac{b}{bc+b+1} + \dfrac{c}{ca+c+1}$ ì ê° ì êµ¬í ì ¬ë ¼. [배점 5, 중상]

▶ 답 :

▷ 정답 : 1

해설

$$\frac{a}{ab+a+1} + \frac{b}{bc+b+1} + \frac{c}{ca+c+1}$$
$$= \frac{a}{ab+a+1} + \frac{ab}{a(bc+b+1)} + \frac{abc}{ab(ca+c+1)}$$
$$= \frac{a}{ab+a+1} + \frac{ab}{abc+ab+a} + \frac{abc}{a^2bc+abc+ab}$$
$$= \frac{a}{ab+a+1} + \frac{ab}{1+ab+a} + \frac{1}{a+1+ab}$$
$$= \frac{a+ab+1}{ab+a+1} = 1$$