

中3 数学 前期期末 対策 ④

問1 (ア) $-5 + 12 = 7$

(イ) $4 - 7 \times (2 - 8) = 4 + 42 = 46$

(ウ) $-24a^3b^3 \div 8ab^4$
 $= \frac{-24a^3b^3}{8ab^4} = -3a^2b$

問2 (ア) $x^2 - ax + 4a - 14 = 0$ の1つの解が2

$x = 2$ を代入

$4 - 2a + 4a - 14 = 0$

$2a = 10$

$a = 5$

$a = 5$ を代入

$x^2 - 5x + 20 - 14 = 0$

$x^2 - 5x + 6 = 0$

$(x-2)(x-3) = 0$

$x = 2, 3$

確認する!

問4 (ア) $\sqrt{5} + 2\sqrt{5} = 3\sqrt{5}$

(イ) $\sqrt{18} - \sqrt{8} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$

(ウ) $\sqrt{3} + \frac{9 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \sqrt{3} + \frac{9\sqrt{3}}{3} = 4\sqrt{3}$

(エ) $\sqrt{2}(\sqrt{7} - \sqrt{3}) = \sqrt{14} - \sqrt{6}$

(オ) $\sqrt{54} - \sqrt{30} \div \sqrt{5} = 3\sqrt{6} - \sqrt{6} = 2\sqrt{6}$

(カ) $(3 - \sqrt{5})^2 - 6(3 - \sqrt{5}) + 9$
 $3 - \sqrt{5} = A$ とおく
 $A^2 - 6A + 9 = (A - 3)^2 = (3 - \sqrt{5} - 3)^2 = (-\sqrt{5})^2 = 5$

(キ) $-\sqrt{\frac{4}{7}} + \sqrt{\frac{7}{4}} = -\frac{\sqrt{4 \times 7}}{\sqrt{7 \times 7}} + \frac{\sqrt{7}}{\sqrt{4}} = -\frac{2\sqrt{7}}{7} + \frac{\sqrt{7}}{2} = \frac{-4\sqrt{7} + 7\sqrt{7}}{14} = \frac{3\sqrt{7}}{14}$

問 5 (ア) $x^2 = 49$

$x = \pm 7$

(イ) $(x+9)^2 = 7$

$x+9 = \pm \sqrt{7}$

$x = -9 \pm \sqrt{7}$

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

$x^2 - 4x - 3 = 0$

因数分解できない

解の公式

$x = \frac{4 \pm \sqrt{16 - 4 \times (-3)}}{2}$

$x = \frac{4 \pm \sqrt{28}}{2}$

$x = 2 \pm \sqrt{7}$

$x^2 - 4x = 3$

平方完成

$x^2 - 4x + 4 = 3 + 4$

$(x-2)^2 = 7$

$x-2 = \pm \sqrt{7}$

$x = 2 \pm \sqrt{7}$

(1) $(x+1)(x-5) + 8 = 0$

$x^2 - 4x - 5 + 8 = 0$

$x^2 - 4x + 3 = 0$

$(x-1)(x-3) = 0$

$x = 1, 3$

(1) $2x^2 - 8x - 3 = 0$

$x = \frac{8 \pm \sqrt{64 - 4 \times 2 \times (-3)}}{4}$

$x = \frac{4 \pm \sqrt{88}}{2}$

$x = \frac{4 \pm \sqrt{22}}{2}$

(1) $(x+2)^2 - 4(x+2) - 21 = 0$

$A^2 - 4A - 21 = 0$

$(A-7)(A+3) = 0$

$(x+2-7)(x+2+3) = 0$

$(x-5)(x+5) = 0$

$x = \pm 5$

(1) $\frac{1}{2}x(10-x) = 8$

$x(10-x) = 16$

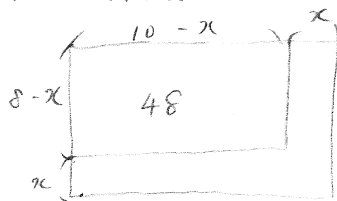
$10x - x^2 = 16$

$0 = x^2 - 10x + 16$

$(x-2)(x-8) = 0$

$x = 2, 8$

問8 A → B



$$(10-x)(8-x) = 48$$

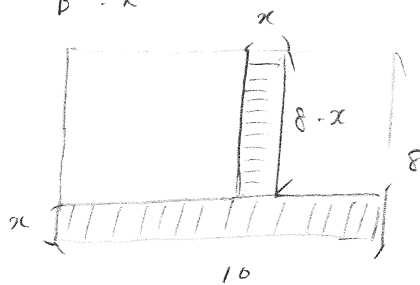
$$80 - 8x - 10x + x^2 = 48$$

$$x^2 - 18x + 32 = 0$$

$$(x-2)(x-16) = 0$$

$$x = 2, 16$$

B → A



$$8 \times 10 - \{10x - x(8-x)\} = 48$$

$$x = 2, 16$$

$$8-x > 0 \quad 10-x > 0 \quad \text{から } x > 0$$

$$8 > x$$

$$10 > x$$

より厳しい

$$0 < x < 8 \text{ より}$$

$$A, 2m$$

問9

(1) 「紙の大きさは2倍になるけど、」

↳ 面積が2倍ということ!

$$\text{つまり四の長さは } \sqrt{2} \text{ 倍} \approx \underline{141\%}$$

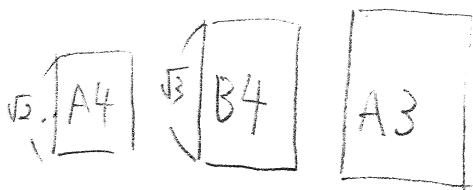
(2) A3 → A4 つまり面積を $\frac{1}{2}$ 倍にする

$$\text{四の長さは } \sqrt{\frac{1}{2}} \text{ 倍} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

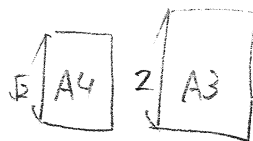
$$= \frac{1.414}{2} = 0.707$$

$$= \underline{71\%}$$

$$(7) A4 : B4 = \sqrt{2} : \sqrt{3}$$



$$A4 : A3 = 1 : \sqrt{2} \text{ となる}$$



$$A4 \text{ の } 4 \text{ は } 2\sqrt{2}$$

$$\text{となる}$$

$$A3 \text{ の } 9 \text{ は } 3^2$$

$$\sqrt{2} \times \sqrt{2} = 2$$

$$B4 \rightarrow A3 \text{ は } x \text{ 倍になる}$$

$$\sqrt{2} \times x = 2 \text{ となる}$$

$$x = \frac{2}{\sqrt{2}}$$

$$x = \frac{2\sqrt{2}}{2}$$

$$x = \frac{2 \times 1.414}{2} = 1.414 \rightarrow \underline{141.4\%}$$

問 11

$$(7) y = ax^2 \text{ に } 1 = 1 \text{ を代入}$$

$$36 = 9a$$

$$a = 4$$

$$y = 4x^2$$

$$(1) y = 4x^2 \text{ に } x = -1 \text{ を代入}$$

$$y = 4 \times (-1)^2$$

$$y = 4$$

$$\underline{x = 4}$$

(4)

$$x = 4 \text{ 時最大}$$

$$y = 4 \times 4^2$$

$$y = 64$$

$$\underline{0 \leq y \leq 64}$$



$$(1) \textcircled{\text{変}} = 4 \times (2 + 5)$$

$$= 28$$

$$\underline{28}$$

$$(7) -24 = 4 \times (t + t + 2)$$

$$-6 = 2t + 2$$

$$-8 = 2t$$

$$t = -4$$

$$\underline{t = -4}$$

問 10

n	1	2	3	4	n
黒	5	¹² 13	¹² 25	¹⁶ 41	$n^2 + (n+1)^2$
白	4	⁸ 12	¹² 24	¹⁶ 40	黒 - 1
全	9	25	49	81	$(2n+1)^2$

(17) 表より 白 40 枚
黒 41 枚

(18) $3^2, 5^2, 7^2, \dots, (2n+1)^2$ 奇数の2乗

(19) $n^2 + (n+1)^2 = 545$

$$n^2 + n^2 + 2n + 1 = 545$$

$$2n^2 + 2n - 544 = 0$$

$$n^2 + n - 272 = 0$$

$$(n-16)(n+17) = 0$$

$$n = 16, -17$$

n は自然数だから

n = 16 は問題に適している

n = -17 は問題に適していない

A. 16番目

(20) 黒 545, 白 544

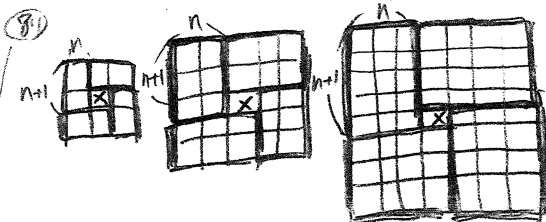
$$\begin{array}{r} 1) \\ \hline \text{全 } 1089 \end{array}$$

$$(2n+1)^2 = 1089$$

$$2n+1 = 33$$

$$2n = 32, -34$$

$$\leftarrow n = 16, -17$$



左上のブロック 427

中心以外が?

ブロックは黒と白 同数だから

$$\text{黒 } (n+1) \times \frac{1}{2} \times 4 + 1 = 2n(n+1) + 1$$

$$\text{白 } (n+1) \times \frac{1}{2} \times 4 = 2n(n+1)$$