中3数学 総合考査Ⅱ 対策プレテスト

1	①	展開	②	因数分解	③	素数
	④	素因数分解	⑤	平方根	⑥	根号

各1点×6

2	(1)	$4x^3+2x^2-6x$	(2)	$2x-3y$	(3)	$6x-12y$

各1点×3

3	(1)	$x^2+10x+16$	(2)	$x^2-8x+16$		
	(3)	$9x^2-49y^2$	(4)	$a^2+8a+16-b^2$		

各1点×4

4	(1)	$(x+6)(x-2)$	(2)	$(x-6)(x-2)$	(3)	$(x+12)(x-12)$
	(4)	$2a(x+6)(x+4)$	(5)	$\frac{1}{6}(x-y)(x+4y)$	(6)	$(x+y-2)(x+y+6)$
	(7)	$(x-y)(a+b)(a-b)$	(8)	$(3a-b)(a+3b)$		

各1点×8

5	(1)	896	(2)	15700		

各3点×2

6	(1)	25個	(2)	$2^5\times3$		
	(3)	16個	(4)	2		

各2点×4

7	(1)	① $4,\ 3\sqrt{2},\ 2\sqrt{5}$	② $\frac{\sqrt{2}}{3},\ \frac{2}{3},\ \frac{\sqrt{3}}{3},\ \frac{2}{\sqrt{3}}$			
	(2)	① 1	② 5	③ 15		
	(3)	$n=2,8,10$	(4)	8360	(5)	$\frac{\sqrt{5}}{37}$

各2点×8

8	(1)	$\sqrt{10}$	(2)	$\sqrt{15}$	(3)	$\frac{\sqrt{6}}{2}$
	(4)	$8\sqrt{5}$	(5)	$9\sqrt{2}$	(6)	$\frac{5\sqrt{6}}{6}$
	(7)	12	(8)	$-2\sqrt{2}-5$	(9)	12

各2点×9

9	解説参照

5点

10	①	$r+a$	②	$2\pi r+\pi a$	③	$r+\frac{a}{2}$

各1点×3

11	(1)	$x=0,-3$	(2)	$x=-1,6$	(3)	$x=2,-8$
	(4)	$x=-2,4$	(5)	$x=-3$	(6)	$x=-1,-4$
	(7)	$x=1$	(8)	$x=5$		

各2点×8

12	(1)	$\frac{18x-1}{6}$	(2)	$x^4-10x^3+25x^2-36$		
	(3)	$x+y=\pm2$	(4)	6		
	(5)	$x=2\sqrt{6}$	(6)	3		
	(7)	816				

各1点×7

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名前 解答

1

① 展開

② 因数分解

③ 素数

④ 素因数分解.

⑤ 平方根

⑥ 根号.

2

(1) $(2x^2+x-3)\times 2x$

$= 4x^3+2x^2-6x$ //

(2) $(-6x^2+9xy)\div(-3x)$

$= 2x-3y$ //

(3) $(4x^2y-8xy^2)\div\frac{2}{3}xy$

$= (4x^2y-8xy^2)\times\frac{3}{2xy}$

$= 6x-12y$ //

3

(1) $(x+2)(x+8) = x^2+10x+16$ //

(2) $(x-4)^2 = x^2-8x+16$ //

(3) $(3x+7y)(3x-7y) = 9x^2-49y^2$ //

(4) $(a-b+4)(a+b+4)$

$= (M-b)(M+b)$ $M=a+4$

$= M^2-b^2$

$= a^2+8a+16-b^2$ //

4

(1) $x^2+4x-12$

$= (x+6)(x-2)$ //

(2) $x^2-8x+12$

$= (x-6)(x-2)$ //

(3) $x^2-144 = (x+12)(x-12)$ //

(4) $2ax^2+20ax+48a$

$= 2a(x^2+10x+24)$

$= 2a(x+6)(x+4)$ //

(5) $\frac{1}{6}x^2+\frac{1}{2}xy-\frac{2}{3}y^2$

$= \frac{1}{6}(x^2+3xy-4y^2)$

$= \frac{1}{6}(x-y)(x+4y)$ //

(6) $(x+y)^2+4(x+y)-12$

$= M^2+4M-12$

$= (M-2)(M+6)$

$= (x+y-2)(x+y+6)$ //

(7) $a^2(x-y)+b^2(y-x)$

$= a^2(x-y)-b^2(x-y)$

$= (x-y)(a^2-b^2)$

$= (x-y)(a+b)(a-b)$ //

(8) $(2a+b)^2-(a-2b)^2$

$= M^2-N^2$

$= (M+N)(M-N)$

$= (2a+b+a-2b)(2a+b-a+2b)$

$= (3a-b)(a+3b)$ //

5

(1) 28×32

$= (30-2)(30+2)$

$= 30^2 - 2^2$

$= 900 - 4$

$= 896$

(2) $75 \times 75 \times 3.14 - 25 \times 25 \times 3.14$

$= 3.14(75^2 - 25^2)$

$= 3.14(75+25)(75-25)$

$= 3.14 \times 100 \times 50$

$= 314 \times 50$

$= 15700$

6

(1) 100以下の素数.

2, 3, 5, 7, 11, 13, 17, 19,
23, 29, 31, 37, 41, 43, 47, 53
59, 61, 67, 71, 73, 79, 83, 89, 97

25個

(2)
2)96
2)48
2)24
2)12
2)6
3

$96 = 2^5 \times 3$

(3) $120 = 2^3 \times 3 \times 5$

約数の個数.

$4 \times 2 \times 2 = 16$個

(4) $72 = 2^3 \times 3^2$

したがって 2

7

(1)① $2\sqrt{5} = \sqrt{20}$

$3\sqrt{2} = \sqrt{18}$

$4 = \sqrt{16}$

したがって.

$4,\ 3\sqrt{2},\ 2\sqrt{5}$

② 2乗した数の大小を比べる.

$\left(\frac{\sqrt{2}}{3}\right)^2 = \frac{2}{9}$

$\left(\frac{2}{\sqrt{3}}\right)^2 = \frac{4}{3} = \frac{12}{9}$

$\left(\sqrt{\frac{2}{3}}\right)^2 = \frac{2}{3} = \frac{6}{9}$

$\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

したがって.

$\frac{\sqrt{2}}{3},\ \frac{2}{3},\ \sqrt{\frac{2}{3}},\ \frac{2}{\sqrt{3}}$

(2)

① $1<\sqrt{3}<2$ より.

1 //

② $5<\sqrt{30}<6$ より.

5 //

③ $15<\sqrt{250}<16$ より.

15 //

(3) $\sqrt{80-8n}$

$80-8n=\square^2$ となればよい.

80以下でそのような数は.

64, 49, 36, 25,
16, 9, 4, 1, 0.

このうち. 条件をみたすのは.

$n=2$ のとき. $80-8n=64$

$n=8$ のとき $80-8n=16$.

$n=10$ のとき $80-8n=0$.

したがって.

$n=2, 8, 10$ //

(4) $\sqrt{70000000}$

$=1000\sqrt{70}$

$=1000\times 8.36$.

$=8360$ //

(5) $x=0.\dot{1}0\dot{8}$ とおくと.

$1000x=108.108108\cdots$

$-)\quad x=0.108108\cdots$

$999x=108$

$x=\frac{108}{999}$

$=\frac{36}{333}$

$=\frac{12}{111}$ //

8

(1) $\sqrt{2} \times \sqrt{5} = \underline{\sqrt{10}}$ //

(2) $\sqrt{12} \times \sqrt{\frac{5}{4}} = \sqrt{12 \times \frac{5}{4}}$

$= \underline{\sqrt{15}}$ //

(3) $\sqrt{6} \div \sqrt{32} \times \sqrt{8}$

$= \sqrt{\frac{3\cancel{6} \times \cancel{8}1}{\cancel{32}\ 4\ 2}}$

$= \sqrt{\frac{3}{2}}$

$= \underline{\frac{\sqrt{6}}{2}}$ //

(4) $3\sqrt{5} + 5\sqrt{5} = \underline{8\sqrt{5}}$ //

(5) $\sqrt{8} + \sqrt{18} + \sqrt{32}$

$= 2\sqrt{2} + 3\sqrt{2} + 4\sqrt{2}$

$= \underline{9\sqrt{2}}$ //

(6) $\frac{\sqrt{2}}{\sqrt{3}} + \frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{6}}{3} + \frac{\sqrt{6}}{2}$

$= \frac{2\sqrt{6} + 3\sqrt{6}}{6}$

$= \underline{\frac{5\sqrt{6}}{6}}$ //

(7) $(\sqrt{3} + \sqrt{2})^2 + (\sqrt{6} - 1)^2$

$= 3 + 2\sqrt{6} + 2 + 6 - 2\sqrt{6} + 1$

$= \underline{12}$ //

(8) $\frac{3}{1-\sqrt{2}} - \frac{\sqrt{2}}{\sqrt{2}+1}$

$= \frac{3(\sqrt{2}+1) - \sqrt{2}(1-\sqrt{2})}{(1-\sqrt{2})(1+\sqrt{2})}$

$= \frac{3\sqrt{2} + 3 - \sqrt{2} + 2}{1-2}$

$= -(2\sqrt{2} + 5)$

$= \underline{-2\sqrt{2} - 5}$ //

(9) $(\sqrt{3}+1)^2 + 2(\sqrt{3}+1)(\sqrt{3}-1) + (\sqrt{3}-1)^2$

$= M^2 + 2MN + N^2$

$= (M+N)^2$

$= (\sqrt{3} + 1 + \sqrt{3} - 1)^2$

$= (2\sqrt{3})^2$

$= \underline{12}$ //

9

連続した2つの奇数を、

$2m-1$, $2m+1$ とおく。

これらの積に1を加えると、

$(2m-1)(2m+1)+1$

$=4m^2-1+1$

$=4m^2$

$=(2m)^2$ となり、

2つの奇数の間の偶数の2乗となる。

10

S = (大きな円) − (小さな円)

$=\pi(r+a)^2-\pi r^2$ ①

$=\pi(r^2+2ar+a^2)-\pi r^2$

$=2\pi ar+\pi a^2$

$=a(2\pi r+\pi a)$ ②

また、$\ell=2\pi\left(r+\frac{a}{2}\right)$ ③

$=2\pi r+\pi a$

11

(1) $x^2+3x=0$.

$x(x+3)=0$.

$x=0,-3$

(2) $x^2-5x-6=0$.

$(x+1)(x-6)=0$.

$x=-1,6$

(3) $x^2+6x-12=4$

$x^2+6x-16=0$.

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

$x=2,-8$

(4) $(x+4)(x-2)=4x$.

$x^2+2x-8=4x$.

$x^2-2x-8=0$.

$(x+2)(x-4)=0$.

$x=-2,4$

(5) $(x+8)^2+8x=(x+2)^2$.

$x^2+16x+64+8x=x^2+4x+4$.

$20x=-60$

$x=-3$

(6) $(2x+3)^2 = x(x-3) - 3$.

$4x^2 + 12x + 9 = x^2 - 3x - 3$.

$3x^2 + 15x + 12 = 0$.

$x^2 + 5x + 4 = 0$.

$(x+1)(x+4) = 0$.

$x = -1, -4$ //

(7) $(x+2)^2 - 6(x+2) + 9 = 0$.

$M^2 - 6M + 9 = 0$.

$(M-3)^2 = 0$.

$M = 3$.

$x + 2 = 3$

$x = 1$ //

(8) $(x+5)^2 - 20(x+5) = -100$

$M^2 - 20M + 100 = 0$.

$(M-10)^2 = 0$.

$M = 10$.

$x + 5 = 10$.

$x = 5$ //

12

(1) $x(3-x) - \frac{(2x-1)^2}{2} + \frac{(1-3x)^2}{3}$

$= 3x - x^2 - \frac{4x^2-4x+1}{2} + \frac{1-6x+9x^2}{3}$

$= \frac{1}{6}(18x - 6x^2 - 12x^2 + 12x - 3 + 2 - 12x + 18x^2)$

$= \frac{1}{6}(18x - 1)$

$= \frac{18x-1}{6}$ //

(2) $(x+1)(x-2)(x-3)(x-6)$.

$= (x+1)(x-6)(x-2)(x-3)$.

$= (x^2-5x-6)(x^2-5x+6)$.

$= (M-6)(M+6)$.

$= M^2 - 36$

$= (x^2-5x)^2 - 36$.

$= x^4 - 10x^3 + 25x^2 - 36$ //

(3) $\begin{cases} xy = -1 \\ x^2 + y^2 = 6 \end{cases}$

$(x+y)^2 = x^2 + 2xy + y^2$

$= 6 + 2 \times (-1)$

$= 6 - 2$

$= 4.$

$x + y = \pm 2$ //

(4)

$(\sqrt{147} + \sqrt{18} - \sqrt{48})(\sqrt{32} + \sqrt{12} - \sqrt{72})$

$= (7\sqrt{3} + 3\sqrt{2} - 4\sqrt{3})(4\sqrt{2} + 2\sqrt{3} - 6\sqrt{2})$

$= (3\sqrt{3} + 3\sqrt{2})(2\sqrt{3} - 2\sqrt{2})$

$= 3(\sqrt{3} + \sqrt{2}) \times 2(\sqrt{3} - \sqrt{2})$

$= 6(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$

$= 6$ //

(5) $\frac{x}{2\sqrt{2}} + \frac{\sqrt{3}}{2} - \frac{\sqrt{2}x - \sqrt{3}}{6} = \sqrt{3}$

$\frac{\sqrt{2}x}{4} + \frac{\sqrt{3}}{2} - \frac{\sqrt{2}x}{6} + \frac{\sqrt{3}}{6} = \sqrt{3}$

$\frac{\sqrt{2}x}{4} - \frac{\sqrt{2}x}{6} = \sqrt{3} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{6}$

$\frac{3\sqrt{2}x - 2\sqrt{2}x}{12} = \frac{6\sqrt{3} - 3\sqrt{3} - \sqrt{3}}{6}$

$\frac{\sqrt{2}}{12}x = \frac{2\sqrt{3}}{6}$

$\frac{\sqrt{2}}{12}x = \frac{\sqrt{3}}{3}$

$x = \frac{\sqrt{3}}{3} \times \frac{12}{\sqrt{2}}$

$x = \frac{4\sqrt{3}}{\sqrt{2}}$

$x = \frac{4\sqrt{6}}{2}$

$x = 2\sqrt{6}$ //

(6) $2 < \sqrt{7} < 3$ より.

$\sqrt{7}$ の整数部分は 2.

小数部分は $\sqrt{7}-2$.

$a = \sqrt{7}-2$.

このとき.

$-(2+\sqrt{7})a + (a+3)(-1+\sqrt{7})$

$= -(2+\sqrt{7})(\sqrt{7}-2) + (\sqrt{7}-2+3)(-1+\sqrt{7})$

$= -(\sqrt{7}+2)(\sqrt{7}-2) + (\sqrt{7}+1)(\sqrt{7}-1)$.

$= -(7-4) + (7-1)$

$= -3+6$.

$= 3$ //

(7) $\sqrt{\frac{3n}{17}}$ が整数となるには.

$n = 3\times 17 \times k^2$

このとき

$\sqrt{\frac{3\times 3\times 17\times k^2}{17}} = 3k$.

これが 10 以上になるとき..

最小の k は $k=4$.

したがって.

$n = 3\times 17\times 4^2$.

$= 816$ //