

Session 1

001

ア	13
イ	-4
ウ	$3b$
エ	$\frac{13a+17b}{6}$
オ	$6+2\sqrt{2}$

$$\begin{aligned}\text{ア} \quad & 7 - (-6) \\ & = 7 + 6 \\ & = 13\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & -8 + (-6)^2 \div 9 \\ & = -8 + 36 \div 9 \\ & = -8 + 4 \\ & = -4\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 4ab^3 \div \frac{8ab^2}{6} \\ & = 4ab^3 \times \frac{6}{8ab^2} \\ & = 3b\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{5a+10b}{3} + \frac{a-b}{2} \\ & = \frac{2(5a+10b)}{6} + \frac{3(a-b)}{6} \\ & = \frac{10a+20b}{6} + \frac{3a-3b}{6} \\ & = \frac{13a+17b}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{72} \div \sqrt{2} + \sqrt{8} \\ & = \sqrt{\frac{72}{2}} + \sqrt{8} \\ & = \sqrt{36} + 2\sqrt{2} \\ & = 6 + 2\sqrt{2}\end{aligned}$$

002

$$x = \frac{-1 \pm \sqrt{22}}{3}$$

$$\begin{aligned}3x^2 + 2x - 7 &= 0 \\ x &= \frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times (-7)}}{2 \times 3} \\ x &= \frac{-2 \pm \sqrt{4 + 4 \times 3 \times 7}}{6} \\ x &= \frac{-2 \pm 2\sqrt{22}}{6} \\ x &= \frac{-1 \pm \sqrt{22}}{3}\end{aligned}$$

003

$$63$$

$7 < \sqrt{n} < 8$ 各辺を2乗する

$$49 < n < 64$$

n は自然数なので、

$$n = 50, 51, 52 \cdots 60, 61, 62, 63$$

004

$$a - 9b < 2$$

全体の紅茶の量：a L

9人に配った紅茶の量：9b L 残りの紅茶の量：

(a - 9b) L

005

$$157\text{cm}$$

生徒	a	b	c	d	e	f
身長(cm)	168	158	165	160	161	160+x

Session 2

006

ア	3
イ	-7
ウ	$\frac{8}{3}xy^2$
エ	$\frac{-2x+13y}{15}$
オ	$5+3\sqrt{3}$

$$\begin{aligned}\text{ア} & -4 - (-7) \\ & = -4 + 7 \\ & = 1\end{aligned}$$

$$\begin{aligned}\text{イ} & -4 - 3^2 \div 3 \\ & = -4 - 9 \div 3 \\ & = -4 - 3 \\ & = -7\end{aligned}$$

$$\begin{aligned}\text{ウ} & 6x^2y^3 \div \frac{9xy}{4} \\ & = 6x^2y^3 \times \frac{4}{9xy} \\ & = \frac{8}{3}xy^2\end{aligned}$$

$$\begin{aligned}\text{エ} & \frac{x+y}{5} - \frac{x-2y}{3} \\ & = \frac{3(x+y)}{15} - \frac{5(x-2y)}{15} \\ & = \frac{3x+3y-5x+10y}{15} \\ & = \frac{-2x+13y}{15}\end{aligned}$$

$$\begin{aligned}\text{オ} & \sqrt{75} \times \frac{1}{\sqrt{3}} + \sqrt{27} \\ & = \sqrt{\frac{75}{3}} + \sqrt{27} \\ & = \sqrt{25} + 3\sqrt{3} \\ & = 5 + 3\sqrt{3}\end{aligned}$$

007

$$x = 4\sqrt{33}$$

因数分解すると： $x^2 - y^2 = (x+y)(x-y)$

$$x+y = (\sqrt{11} + \sqrt{3}) + (\sqrt{11} - \sqrt{3}) = 2\sqrt{11}$$

$$x-y = (\sqrt{11} + \sqrt{3}) - (\sqrt{11} - \sqrt{3}) = 2\sqrt{3}$$

$$\begin{aligned}& (x+y)(x-y) \\ & = (2\sqrt{11})(2\sqrt{3}) \\ & = 4\sqrt{33}\end{aligned}$$

008

$$y = \frac{14}{x}$$

$$y = \frac{a}{x} \text{ のとき、} a = xy = 14$$

009

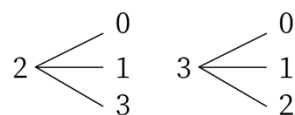
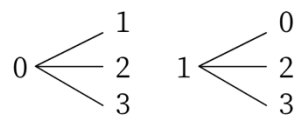
エ

$$\text{球の表面積} = 4\pi r^2$$

$$\text{球の体積} = \frac{4\pi r^3}{3}$$

010

9通り



2けたの整数は、

10, 12, 13, 20, 21, 22, 30, 31, 32 の9通り

Session 3

011

ア	-8
イ	-5
ウ	$\frac{10ab}{3}$
エ	$\frac{7a+b}{12}$
オ	$4\sqrt{10}$

$$\begin{aligned}\text{ア} &= -2 - 6 \\ &= -8\end{aligned}$$

$$\begin{aligned}\text{イ} &= -2 + (-3)^2 \div (-3) \\ &= -2 + 9 \div (-3) \\ &= -2 - 3 \\ &= -5\end{aligned}$$

$$\begin{aligned}\text{ウ} &= 5a^2b^3 \div \frac{3ab^3}{\frac{2}{2}} \\ &= 5a^2b^3 \times \frac{2}{3ab^2} \\ &= \frac{10ab}{3}\end{aligned}$$

$$\begin{aligned}\text{エ} &= \frac{5a-b}{4} - \frac{2a-b}{3} \\ &= \frac{3(5a-b)}{12} - \frac{4(2a-b)}{12} \\ &= \frac{15a-3b-8a+4b}{12} \\ &= \frac{7a+b}{12}\end{aligned}$$

$$\begin{aligned}\text{オ} &= \sqrt{200} \div \sqrt{5} + \sqrt{40} \\ &= \sqrt{\frac{200}{5}} + \sqrt{40} \\ &= \sqrt{40} + \sqrt{40} \\ &= 2\sqrt{10} + 2\sqrt{10} \\ &= 4\sqrt{10}\end{aligned}$$

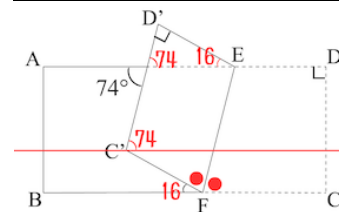
012

$$a = -3$$

$$\begin{aligned}3x - 4 &= x - 2a \\ 3 \times 5 - 4 &= 5 - 2a \\ 2a &= -11 + 5 \\ 2a &= -6 \\ a &= -3\end{aligned}$$

013

$$82^\circ$$



014

$$a = 10$$

$$\text{変化の割合} = \frac{y \text{の増加量}}{x \text{の増加量}}$$

$$13 = \frac{(a+3)^2 - a^2}{(a+3) - a}$$

$$13 = \frac{a^2 + 6a + 9 - a^2}{(a+3) - a}$$

$$13 = \frac{6a + 9}{3}$$

$$13 = 2a + 3$$

$$2a = 13 - 3$$

$$a = 10$$

015

$$c < b < a$$

平均値 $a=3.3\text{km}$

中央値 $b=2.5\text{km}$ (20 番と 21 番の平均)

最頻値 $c=1.5\text{km}$ (最も度数が大きい階級)

Session 4

016

ア	8
イ	-9
ウ	$3x^2y$
エ	$\frac{-5a+19b}{12}$
オ	$2\sqrt{6}-2\sqrt{3}$

$$\begin{aligned}\text{ア} &= 5 - (-3) \\ &= 5 + 3 \\ &= 8\end{aligned}$$

$$\begin{aligned}\text{イ} &= -7 + (-2^2) \div 2 \\ &= -7 + (-4) \div 2 \\ &= -7 - 2 \\ &= -9\end{aligned}$$

$$\begin{aligned}\text{ウ} &= 9x^3 \div 21xy \times 7y^2 \\ &= \frac{9x^3 \times 7y^2}{21xy} \\ &= 3x^2y\end{aligned}$$

$$\begin{aligned}\text{エ} &= \frac{a+b}{12} - \frac{a-3b}{2} \\ &= \frac{a+b}{12} - \frac{6(a-3b)}{12} \\ &= \frac{a+b-6a+18b}{12} \\ &= \frac{-5a+19b}{12}\end{aligned}$$

$$\begin{aligned}\text{オ} &= \sqrt{48} \times \frac{1}{\sqrt{2}} - \sqrt{12} \\ &= \sqrt{\frac{48}{2}} - 2\sqrt{3} \\ &= \sqrt{24} - 2\sqrt{3} \\ &= 2\sqrt{6} - 2\sqrt{3}\end{aligned}$$

007

$$x = -3, 8$$

$$\begin{aligned}x^2 - 5x - 24 &= 0 \\ (x+3)(x-8) &= 0 \\ x &= -3, 8\end{aligned}$$

018

$$6$$

$$\sqrt{150n} = \sqrt{2 \times 3 \times 5 \times 5 \times n}$$

019

$$(1000y - 260x) \text{ m}$$

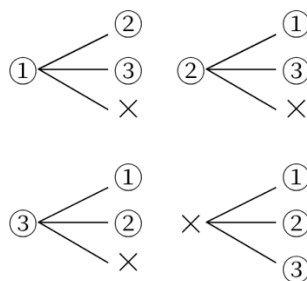
$$\begin{aligned}y\text{km} &= 1000ym \\ \text{距離} &= \text{速さ} \times \text{時間}\end{aligned}$$

020

A さん	$\frac{1}{4}$
B さん	$\frac{1}{4}$

あたりを①②③, はずれを×とする。

A さん - B さん



Session 5

021

ア	-6
イ	-11
ウ	$6ab^3$
エ	$\frac{a+3}{2}$
オ	$-2\sqrt{2}$

$$\begin{aligned}\text{ア} \quad & -10 - (-4) \\ & = -10 + 4 \\ & = -6\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 14 \div (-7) - (-3)^2 \\ & = -2 - 9 \\ & = -11\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 9a^2b^3 \div \frac{3}{2} ab \times b \\ & = \frac{9a^2b^3 \times 2 \times b}{3ab} \\ & = 6ab^3\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & a - \frac{a-3}{2} \\ & = \frac{2a}{2} - \frac{a-3}{2} \\ & = \frac{2a - a + 3}{2} \\ & = \frac{a+3}{2}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{48} \div \sqrt{2} \div (-\sqrt{3}) \\ & = -\sqrt{48} \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{3}} \\ & = -\sqrt{8} \\ & = -2\sqrt{2}\end{aligned}$$

022

5

$$\begin{aligned}& 5(x+2y) - 4(2x+3y) \\ & = 5x + 10y - 8x - 12y \\ & = -3x - 2y \\ & x = 3, y = -7 \text{ を代入} \\ & = -3 \times 3 - 2 \times (-7) \\ & = -9 + 14 \\ & = 5\end{aligned}$$

023

$n=5$

$$180n = 2^2 \times 3^2 \times 5$$

024

$\frac{4}{5}x$ 個

先週作られた個数を y とすると

$$\text{今週は } x = \frac{125}{100}y$$

025

$V = 2\pi a^2$

$$\text{円錐の体積} = \frac{1}{3} \times \text{半径}^2 \times \text{高さ} \times \pi$$

$$V = \frac{1}{3} \times a^2 \times 6 \times \pi$$

$$V = 2\pi a^2$$

Session 6

026

ア	-4
イ	-16
ウ	$\frac{60}{7}a^2$
エ	$\frac{7a+11b}{6}$
オ	$-\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & 2-6 \\ & = -4\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & -8-4^2 \div 2 \\ & = -8-16 \div 2 \\ & = -8-8\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & \frac{15}{2}a^3b^2 \div \frac{7}{8}ab^2 \\ & = \frac{15}{2}a^3b^2 \times \frac{8}{7ab^2} \\ & = \frac{15a^3b^2 \times 8}{2 \times 7ab^2} \\ & = \frac{60}{7}a^2\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{5a+b}{3} - \frac{a-3b}{2} \\ & = \frac{2(5a+b)}{6} - \frac{3(a-3b)}{6} \\ & = \frac{10a+2b-3a+9b}{6} \\ & = \frac{7a+11b}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & -\sqrt{45} + \sqrt{100} \times \frac{1}{\sqrt{5}} \\ & = -\sqrt{45} + \frac{\sqrt{100}}{\sqrt{5}} \\ & = -\sqrt{45} + \sqrt{20} \\ & = -3\sqrt{5} + 2\sqrt{5} \\ & = -\sqrt{5}\end{aligned}$$

027

$$a = -4$$

$$-x^2 + ax + 21 = 0$$

$$-3^2 + 3a + 21 = 0$$

$$-9 + 3a + 21 = 0$$

$$3a = 9 - 21$$

$$a = -4$$

028

$$y = \frac{6}{x}$$

$$y = \frac{1}{2}x + 2 \quad \text{に } x=2 \text{ を代入}$$

$$y = \frac{1}{2} \times 2 + 2$$

$$y = 3$$

求める反比例のグラフは(2,3)を通る

$$y = \frac{a}{x}$$

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

$$a = 6$$

029

$$3\text{cm}$$

$$\text{半円の弧の長さ} = \text{底面の円周} \quad 12\pi \times \frac{1}{2} = 2\pi r$$

030

A=5
B=4

人数の合計が 20 人なので、A+B=9 人

20 人のデータの中央値は、小さい方から 10 番目と 11 番目の値の平均です。

中央値が 35 点なので

10 番目が 30 点、11 番目が 40 点

または、10 番目も 11 番目も 35 点

Session 7

031

ア	-12
イ	87
ウ	$8xy$
エ	$\frac{2a+7b}{9}$
オ	$-2\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & -2 - 5 \times 2 \\ & = -2 - 10 \\ & = -12\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 6 \times (-4)^2 - 3^2 \\ & = 6 \times 16 - 9 \\ & = 96 - 9 \\ & = 87\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 6x^2y^3 \div \frac{3}{4}xy^2 \\ & = 6x^2y^3 \times \frac{4}{3xy^2} \\ & = 8xy\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{5a+b}{9} - \frac{a-2b}{3} \\ & = \frac{5a+b}{9} - \frac{3(a-2b)}{9} \\ & = \frac{5a+b-3a+6b}{9} \\ & = \frac{2a+7b}{9}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{60} \times \frac{1}{\sqrt{3}} - \sqrt{80} \\ & = \frac{\sqrt{60}}{\sqrt{3}} - 4\sqrt{5} \\ & = 2\sqrt{5} - 4\sqrt{5} \\ & = -2\sqrt{5}\end{aligned}$$

032

$$x = 2 \pm \sqrt{5}$$

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

$x-2 = A$ と置く

$$A^2 - 5 = 0$$

$$A^2 = 5$$

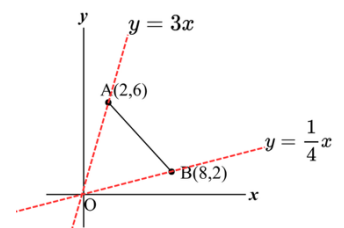
$$A = \pm\sqrt{5}$$

$$x-2 = \pm\sqrt{5}$$

$$x = 2 \pm \sqrt{5}$$

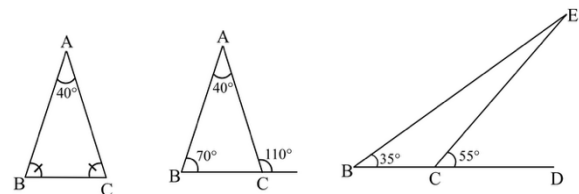
033

ア	$\frac{1}{4}$
イ	3



034

$$20^\circ$$



二等辺三角形の底角は等しい

三角形の外角はそれととなり合わない2つの内角の和に等しい。

035

$$0.25$$

$$\text{相対度数} = \frac{\text{その階級の度数}}{\text{度数の合計}} = \frac{9}{36}$$

Session 8

036

ア	8
イ	1
ウ	$\frac{3}{2}y$
エ	$\frac{2a+13b}{6}$
オ	$2\sqrt{3}$

$$\begin{aligned}\text{ア} \quad & 6 - (-2) \\ & = 6 + 2 \\ & = 8\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & (-4)^2 - 5 \times 3 \\ & = 16 - 15 \\ & = 1\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & \frac{9}{4}xy^3 \div \frac{3}{2}xy^2 \\ & = \frac{9xy^3}{4} \times \frac{2}{3xy^2} \\ & = \frac{3}{2}y\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{a+3b}{2} - \frac{a-4b}{6} \\ & = \frac{3(a+3b)}{6} - \frac{a-4b}{6} \\ & = \frac{3a+9b-a+4b}{6} \\ & = \frac{2a+13b}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{27} - 3\sqrt{2} \div \sqrt{6} \\ & = 3\sqrt{3} - 3\sqrt{2} \times \frac{1}{\sqrt{6}} \\ & = 3\sqrt{3} - 3 \times \frac{1}{\sqrt{3}} \\ & = 3\sqrt{3} - 3 \times \frac{\sqrt{3}}{\sqrt{3}\sqrt{3}} \\ & = 3\sqrt{3} - \sqrt{3} \\ & = 2\sqrt{3}\end{aligned}$$

037

$$x = 1 \pm \sqrt{6}$$

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

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-5)}}{2}$$

$$x = \frac{2 \pm \sqrt{4 + 20}}{2}$$

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

$$x = 1 \pm \sqrt{6}$$

038

比例の関係	① ④
反比例の関係	②

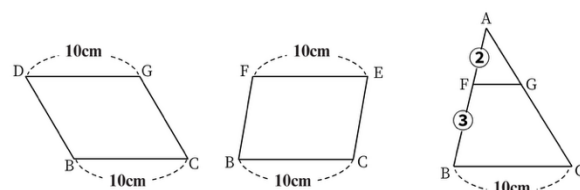
比例 $y=ax+b$

反比例 $y=\frac{a}{x}$, $xy=a$

- ① $y=82x$ ② $xy=20$
③ $y=-x+240$ ④ $y=50x$

039

$$16\text{cm}$$



DBCG と FBCE は平行四辺形なので、

$$BC=DG=FE=10\text{cm}$$

FG//BC より、 $\triangle AFG \sim \triangle ABC$, $AF:AB=FG:BC$

$$2:5=FG:10$$

$$FG=4$$

040

$$5 \text{ 回}$$

箱ひげ図より、

第1四分位 50 回, 第3四分位 55 回

$$\text{四分位範囲} = 55 - 50 = 5 \text{ 回}$$

Session 9

041

ア	4
イ	-20
ウ	$6a^2$
エ	$\frac{-a+b}{6}$
オ	$\sqrt{2}$

$$\begin{aligned}\text{ア} \quad & 6 - 5 - (-3) \\ & = 6 - 5 + 3 \\ & = 4\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 12 \div (-3) - 4^2 \\ & = -4 - 16 \\ & = -20\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & \frac{4}{3}a^3b^2 \div \frac{2}{9}ab^2 \\ & = \frac{4a^3b^2}{3} \times \frac{9}{2ab^2} \\ & = 6a^2\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{a+2b}{3} - \frac{a+b}{2} \\ & = \frac{2(a+2b)}{6} - \frac{3(a+b)}{6} \\ & = \frac{2a+4b-3a-3b}{6} \\ & = \frac{-a+b}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{32} - 6 \div \sqrt{2} \\ & = 4\sqrt{2} - \frac{6}{\sqrt{2}} \\ & = 4\sqrt{2} - \frac{6\sqrt{2}}{\sqrt{2}\sqrt{2}} \\ & = 4\sqrt{2} - 3\sqrt{2} \\ & = \sqrt{2}\end{aligned}$$

042

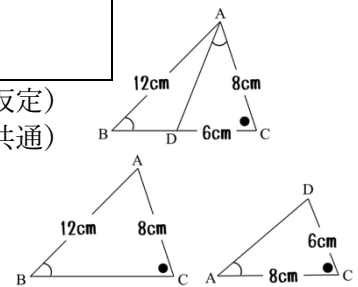
$$x = -2, 8$$

$$\begin{aligned}x^2 - 6x - 16 &= 0 \\ (x+2)(x-8) &= 0 \\ x &= -2, 8\end{aligned}$$

043

$$9\text{cm}$$

$$\begin{aligned}\angle ABC &= \angle DAC \text{ (仮定)} \\ \angle ACB &= \angle DCA \text{ (共通)} \\ \triangle ABC &\sim \triangle DAC \\ 8:6 &= 12:AD \\ 8AD &= 72 \\ AD &= 9\end{aligned}$$



044

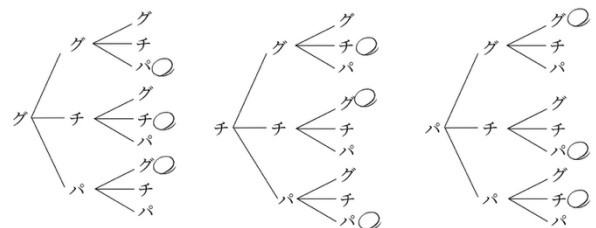
$$0 \leq y \leq 12$$

$$\begin{aligned}x = -1 \text{ のとき, } y &= 3 \times (-1)^2 = 3 \\ x = 2 \text{ のとき, } y &= 3 \times 2^2 = 12\end{aligned}$$

045

$$\frac{1}{3}$$

Aさん Bさん Cさん



Session 10

046

ア	-9
イ	-20
ウ	$\frac{21}{4}a$
エ	$\frac{7a-5b}{12}$
オ	$5\sqrt{3}$

$$\begin{aligned}\text{ア} \quad & -2-7 \\ & = -9\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 45 \div (-3)^2 - 5^2 \\ & = \frac{45}{9} - 25 \\ & = 5 - 25 \\ & = -20\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & (-3ab)^2 \div \frac{12}{7}ab^2 \\ & = 9a^2b^2 \times \frac{7}{12ab^2} \\ & = \frac{21}{4}a\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{4a-2b}{3} - \frac{3a-b}{4} \\ & = \frac{4(4a-2b)}{12} - \frac{3(3a-b)}{12} \\ & = \frac{16a-8b-9a+3b}{12} \\ & = \frac{7a-5b}{12}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{48} + 2\sqrt{6} \times \frac{1}{\sqrt{8}} \\ & = 4\sqrt{3} + 2\sqrt{6} \times \frac{1}{2\sqrt{2}} \\ & = 4\sqrt{3} + \sqrt{3} \\ & = 5\sqrt{3}\end{aligned}$$

047

-10

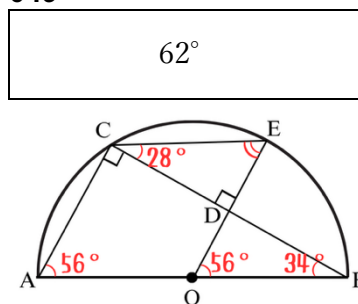
$x=4$ のとき, $y=-2 \times 4+7=-1$
 $x=-1$ のとき, $y=-2 \times (-1)+7=9$
 y の増加量 $-1-9=-10$

048

イ

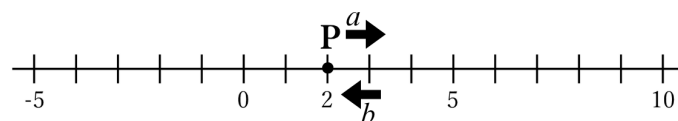
ア $n-2 \cdots n$ が偶数のとき偶数
 イ $4n+5 \cdots n$ が奇数でも偶数でも奇数になる
 ウ $3n \cdots n$ が偶数のとき偶数
 エ $m^2-1 \cdots n$ が奇数のとき偶数

049



050

$\frac{5}{9}$



a \ b	1	2	3	4	5	6
1	1,1 ②	1,2 ①	1,3 ①	1,4 ①	1,5 ②	1,6 -3
2	2,1 3	2,2 ②	2,3 ①	2,4 ①	2,5 ①	2,6 ②
3	3,1 4	3,2 3	3,3 ②	3,4 ①	3,5 ①	3,6 ①
4	4,1 5	4,2 4	4,3 3	4,4 ②	4,5 ①	4,6 ①
5	5,1 6	5,2 5	5,3 4	5,4 3	5,5 ②	5,6 ①
6	6,1 7	6,2 6	6,3 5	6,4 4	6,5 3	6,6 ②

Session 11

051

ア	10
イ	-19
ウ	$-\frac{20}{3}a$
エ	$\frac{a+17b}{8}$
オ	$-2\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & 5 - (-5) \\ & = 10\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & -5 \times 3 - (-2)^2 \\ & = -15 - 4 \\ & = -19\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & (-4a^2b)^2 \div \left(-\frac{12}{5}a^3b^2\right) \\ & = 16a^4b^2 \times \left(-\frac{5}{12a^3b^2}\right) \\ & = -\frac{20}{3}a\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{a+3b}{2} - \frac{3a-5b}{8} \\ & = \frac{4(a+3b)}{8} - \frac{3a-5b}{8} \\ & = \frac{4a+12b-3a+5b}{8} \\ & = \frac{a+17b}{8}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{60} \times \frac{1}{\sqrt{3}} - \sqrt{80} \\ & = 2\sqrt{5} - 4\sqrt{5} \\ & = -2\sqrt{5}\end{aligned}$$

052

エ

十の位の数が3、一の位の数2である2けたの自然数なら、 $3 \times 10 + 2$

十の位の数a、一の位の数bである2けたの自然数は、 $10a+b$

053

a	2
b	-5

$$a(\text{一次関数の傾き}=\text{変化の割合})=\frac{4}{2}=2$$

問題より (1, -3)

$$-3=2 \times 1 + b$$

$$-3=2+b$$

$$-b=2+3$$

$$b=-5$$

054

12 cm

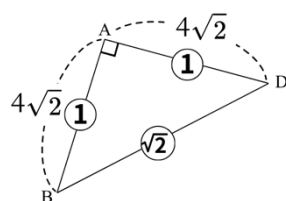
面積比は相似比の2乗

球Aと球Bの面積比9:1 → 相似比3:1

球Aの半径をaとすると、3:1 = a:4

055

$4\sqrt{3}$

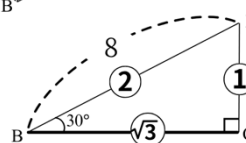


$$\angle A=90^\circ$$

$$\angle B=D=45^\circ$$

$$\text{辺の比 } 1:1:\sqrt{2}$$

$$BD=4\sqrt{2} \times \sqrt{2}=8$$



$$\angle C=90^\circ$$

$$\angle B=30^\circ$$

$$\text{辺の比 } 1:2:\sqrt{3}$$

$$DC=4$$

$$1:\sqrt{3}=4:BC$$

$$BC=4\sqrt{3}$$

Session 12

056

ア	-6
イ	54
ウ	$25a$
エ	$\frac{3a+4b}{6}$
オ	$6+2\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & 4-10 \\ & = -6\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & (-3)^2 \div \frac{1}{6} \\ & = 9 \times 6 \\ & = 54\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 30ab \div \frac{6}{5} b \\ & = 30ab \times \left(-\frac{5}{6b}\right) \\ & = 25a\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{a+2b}{2} - \frac{b}{3} \\ & = \frac{3(a+2b)}{6} - \frac{2b}{6} \\ & = \frac{3a+6b-2b}{6} \\ & = \frac{3a+4b}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & (\sqrt{5}+1)^2 \\ & = 5+2\sqrt{5}+1 \\ & = 6+2\sqrt{5}\end{aligned}$$

057

$x = 6$	$y = 5$
---------	---------

$$2x+6y=42 \cdots \textcircled{1} \times 2$$

$$\text{--}) \quad 2x-y=7 \cdots \textcircled{3}$$

058

イ ウ

偶数 or 奇数： $6n+3 = 2 \times 3n + 3$

$6n = 2 \times 3n$ は常に偶数

偶数+3 = 奇数 → 常に奇数

3 の倍数かどうか： $6n+3 = 3(2n+1) \rightarrow 3$ でくくれるので、常に 3 の倍数

4 の倍数かどうか： 具体的な値で確認：

$n=1$: $6 \times 1 + 3 = 9 \rightarrow 4$ で割ると余り 1

$n=2$: $6 \times 2 + 3 = 15 \rightarrow 4$ で割ると余り 3

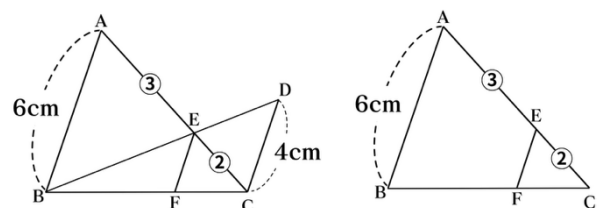
$n=3$: $6 \times 3 + 3 = 21 \rightarrow 4$ で割ると余り 1

$n=4$: $6 \times 4 + 3 = 27 \rightarrow 4$ で割ると余り 3

4 で割った余りは 1 または 3 となり、4 の倍数にはならない。

059

$\frac{12}{5} \text{ cm}$



$$DC : AB = DC : AB = 2 : 3$$

$$CE : CA = EF : AB$$

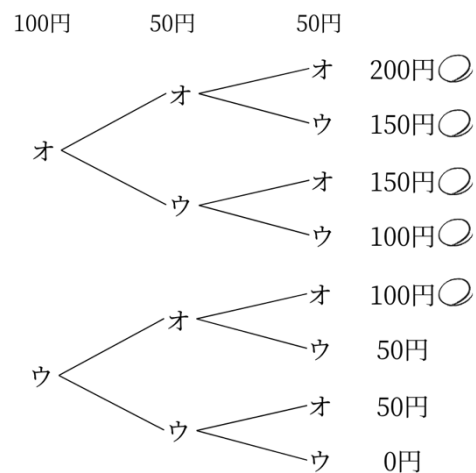
$$2 : 5 = EF : 6$$

$$5EF = 12$$

$$EF = \frac{12}{5}$$

060

$\frac{5}{8}$



Session 13

061

ア	-4
イ	-7
ウ	$18x$
エ	$\frac{5}{4}a - b$ または、 $\frac{5a - 4b}{4}$
オ	$5\sqrt{3}$

$$\begin{aligned}\text{ア} \quad & -6 - (-2) \\ & = -6 + 2 \\ & = -4\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 6 \div (-2) - 4 \\ & = -3 - 4 \\ & = -7\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 6x^2 \div (-3xy)^2 \times 27 \times xy^2 \\ & = \frac{6x^2 \times 27 \times xy^2}{9x^2y^2} \\ & = 18x\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & a + b + \frac{1}{4}(a - 8b) \\ & = \frac{4(a+b)}{4} + \frac{a-8b}{4} \\ & = \frac{4a + 4b + a - 8b}{4} \\ & = \frac{5a - 4b}{4}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \frac{9}{\sqrt{3}} + \sqrt{12} \\ & = \frac{9\sqrt{3}}{\sqrt{3}\sqrt{3}} + 2\sqrt{3} \\ & = 3\sqrt{3} + 2\sqrt{3} \\ & = 5\sqrt{3}\end{aligned}$$

062

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

$y = ax^2$ に $(-2, 6)$ を代入

$$6 = a(-2)^2$$

$$6 = 4a$$

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

063

$$1$$

$$4^2 = 16, 5^2 = 25$$

$$4 < \sqrt{17} < 5$$

$$\sqrt{17} = 4 + x \quad (x \text{ は小数部分})$$

$$x = \sqrt{17} - 4$$

$$x^2 + 8x$$

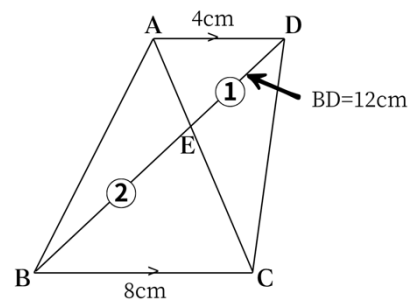
$$(\sqrt{17} - 4)^2 + 8(\sqrt{17} - 4)$$

$$= 17 - 8\sqrt{7} + 16 + 8\sqrt{17} - 32$$

$$= 1$$

064

$$8\text{cm}$$



$$BE = 12 \times \frac{2}{3}$$

065

$$\text{ウ}$$

ア 第1四分位数：A組は3冊，B組は4冊

イ 四分位範囲が最も小さいのはB組

Session 14

066

ア	9
イ	8
ウ	$-18a$
エ	$\frac{5}{18}x$
オ	$\frac{\sqrt{2}}{3}$

$$\begin{aligned}\text{ア} \quad & 5 - (-4) \\ & = 5 + 4 \\ & = 9\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 6 - (-4) \div 2 \\ & = 6 + 2 \\ & = 8\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & -12ab \times (-3a)^2 \div 6a^2b \\ & = \frac{-12ab \times 9a^2}{6a^2b} \\ & = -18a\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{3x-2}{6} - \frac{2x-3}{9} \\ & = \frac{3(3x-2)}{18} - \frac{2(2x-3)}{18} \\ & = \frac{9x-6-4x+6}{18} \\ & = \frac{5x}{18}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \frac{\sqrt{2}}{2} - \frac{1}{3\sqrt{2}} \\ & = \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{3\sqrt{2}\sqrt{2}} \\ & = \frac{3\sqrt{2}}{6} - \frac{\sqrt{2}}{6} \\ & = \frac{2\sqrt{2}}{6} \\ & = \frac{\sqrt{2}}{3}\end{aligned}$$

067

$$x = \frac{-3 \pm \sqrt{41}}{4}$$

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

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

$$x = \frac{-3 \pm \sqrt{9+32}}{4}$$

$$x = \frac{-3 \pm \sqrt{41}}{4}$$

068

$$8, 9$$

連続する2つの整数を $n, n+1$ とする。

$$n(n+1) = n + (n+1) + 55$$

$$n^2 + n = 2n + 1 + 55$$

$$n^2 + n - 2n - 56 = 0$$

$$n^2 - n - 56 = 0$$

$$(n+7)(n-8) = 0$$

$$n = -7, 8 \quad n \text{ は自然数なので } n=8$$

069

$$6\sqrt{10}\pi \text{ cm}^3$$

三平方の定理を使って円錐の高さ AO を求める

$$(AB)^2 = (OB)^2 + (AO)^2$$

$$7^2 = 3^2 + (AO)^2$$

$$(AO)^2 = 49 - 9 +$$

$$AO = \sqrt{40}$$

$$AO = \sqrt{40} = 2\sqrt{10}$$

$$\text{円錐の体積} = \frac{1}{3} \times \text{底面積} \times \text{高さ}$$

$$= \frac{1}{3} \times 3^2\pi \times 2\sqrt{10}$$

$$= \frac{1}{3} \times 3^2\pi \times 2\sqrt{10}$$

$$= 6\sqrt{10}\pi$$

070

中央値	21 m
最頻値	17 m

《中央値》データの総数は10（偶数）なので、

5番目と6番目の値の平均値 $= (20+22) \div 2$

《最頻値》データの中で最も多く出てくる値

Session 15

071

ア	6
イ	21
ウ	$2a^3$
エ	$\frac{a+8b}{15}$
オ	$2\sqrt{2}$

$$\begin{aligned}\text{ア} \quad & -1 - (-7) \\ & = -1 + 7 \\ & = 6\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & -2^2 + (-5)^2 \\ & = -4 + 25 \\ & = 21\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 6a^2 \times \frac{1}{3} a \\ & = 2a^3\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{7a+b}{5} - \frac{4a-b}{3} \\ & = \frac{3(7a+b)}{15} - \frac{5(4a-b)}{15} \\ & = \frac{21a+3b-20a+5b}{15} \\ & = \frac{a+8b}{15}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{18} - \frac{4}{\sqrt{8}} \\ & = 3\sqrt{2} - \frac{4}{2\sqrt{2}} \\ & = 3\sqrt{2} - \frac{2\sqrt{2}}{\sqrt{2}\sqrt{2}} \\ & = \frac{12\sqrt{2}}{4} - \frac{4\sqrt{2}}{4} \\ & = \frac{8\sqrt{2}}{4} \\ & = 2\sqrt{2}\end{aligned}$$

072

$$y = 16$$

反比例 $y = \frac{a}{x}$, $xy = a$

$$a = 32$$

$$y = \frac{32}{x}$$

$$y = \frac{32}{2} = 16$$

073

$$a = 5$$

$$\sqrt{25} < \sqrt{30} < \sqrt{36}$$

$$5 < \sqrt{30} < 6$$

$$a = 1, 2, 3, 4, 5$$

074

$$4\sqrt{5} \text{ cm}^2$$

三平方の定理

$$(AB)^2 + (BC)^2 = (AC)^2$$

$$4^2 + (BC)^2 = 6^2$$

$$(BC)^2 = 6^2 - 4^2$$

$$(BC)^2 = 36 - 16$$

$$BC = \pm 2\sqrt{5}$$

$$BC > 0 \text{ より、} BC = 2\sqrt{5}$$

$$\triangle ABC = \frac{1}{2} \times 4 \times 2\sqrt{5} = 4\sqrt{5} \text{ cm}^2$$

075

$$\frac{3}{100} a \text{ 人}$$

Session 16

076

ア	8
イ	-12
ウ	$4a$
エ	$\frac{4x-9y}{4}$
オ	$3\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & -5 + 1 - (-12) \\ & = -5 + 1 + 12 \\ & = 8\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & 6 - (-3)^2 \times 2 \\ & = 6 - 18 \\ & = -12\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 2ab \div \frac{b}{2} \\ & = 2ab \times \frac{2}{b} \\ & = 4a\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{3x-5y}{2} - \frac{2x-y}{4} \\ & = \frac{2(3x-5y)}{4} - \frac{2x-y}{4} \\ & = \frac{6x-10y-2x+y}{4} \\ & = \frac{4x-9y}{4}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \frac{5}{\sqrt{5}} + \sqrt{20} \\ & = \frac{5\sqrt{5}}{\sqrt{5}\sqrt{5}} + 2\sqrt{5} \\ & = \sqrt{5} + 2\sqrt{5} \\ & = 3\sqrt{5}\end{aligned}$$

077

$$x = \frac{-5 \pm \sqrt{17}}{2}$$

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

$$x = \frac{-5 \pm \sqrt{5^2 - 4 \times 1 \times 2}}{2 \times 1}$$

$$x = \frac{-5 \pm \sqrt{25-8}}{2}$$

$$x = \frac{-5 \pm \sqrt{17}}{2}$$

078

$$10$$

$$\text{変化の割合} = \frac{2 \times 4^2 - 2 \times 1^2}{4 - 1}$$

079

$$3\sqrt{3} \text{ cm}$$

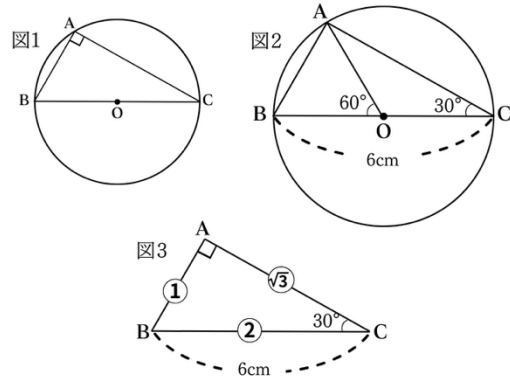


図1 半円の弧に対する円周角は 90°

図2 弧 AB に対する中心角 60° 円周角 30°

図3 90° 60° 30° の直角三角形の辺の比は

$$1:2:\sqrt{3}$$

080

$$70 \text{ 回}$$

最頻値：度数分布表で、度数のもっとも多い階級の階級値 $(60+80) \div 2 = 70$

Session 17

081

ア	7
イ	-4
ウ	$15xy$
エ	$\frac{7x+5y}{6}$
オ	$4\sqrt{5}$

$$\begin{aligned}\text{ア} \quad & 7 - (-3) - 3 \\ & = 7 + 3 - 3 \\ & = 7\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & -8 + 6^2 \div 9 \\ & = -8 + 36 \div 9 \\ & = -8 + 4 \\ & = -4\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & 5x^2y \div \frac{x}{3} \\ & = 5x^2y \times \frac{3}{x} \\ & = 15xy\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{x+2y}{2} + \frac{4x-y}{6} \\ & = \frac{3(x+2y)}{6} + \frac{4x-y}{6} \\ & = \frac{3x+6y+4x-y}{6} \\ & = \frac{7x+5y}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \sqrt{20} + \frac{10}{\sqrt{5}} \\ & = 2\sqrt{5} + \frac{10\sqrt{5}}{\sqrt{5}\sqrt{5}} + \\ & = 2\sqrt{5} + 2\sqrt{5} \\ & = 4\sqrt{5}\end{aligned}$$

082

$$x = -2 \pm \sqrt{5}$$

$$x^2 + 4x = 1$$

$$x^2 + 4x - 1 = 0$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

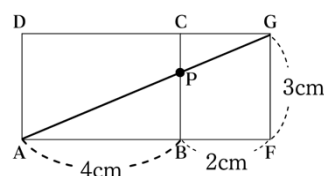
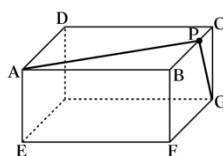
$$x = \frac{-4 \pm \sqrt{20}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{5}}{2}$$

$$x = -2 \pm \sqrt{5}$$

083

$$3\sqrt{5} \text{ cm}$$



展開図をかき、A, P, G が一直線上にあるとき、最短距離となる。

$$\text{三平方の定理 } 6^2 + 3^2 = (AG)^2$$

$$(AG)^2 = 6^2 + 3^2$$

$$AG = \sqrt{45} = 3\sqrt{5}$$

084

$$c = -5a + 2b$$

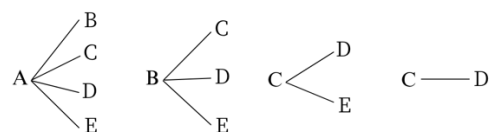
$$a = \frac{2b-c}{5}$$

$$5a = 2b - c$$

$$c = -5a + 2b$$

085

$$\frac{2}{5}$$



Session 18

086

ア	4
イ	28
ウ	$-\frac{9}{4}xy$
エ	$\frac{7x+y}{6}$
オ	$3\sqrt{3}$

$$\begin{aligned}\text{ア} \quad & 1 - (2 - 5) \\ & = 1 - (-3) \\ & = 4\end{aligned}$$

$$\begin{aligned}\text{イ} \quad & (-6)^2 + 24 \div (-3) \\ & = 36 - 8 \\ & = 28\end{aligned}$$

$$\begin{aligned}\text{ウ} \quad & \frac{15}{8}x^2y \div \left(-\frac{5}{6}x\right) \\ & = \frac{15}{8}x^2y \times \left(-\frac{6}{5x}\right) \\ & = -\frac{9}{4}xy\end{aligned}$$

$$\begin{aligned}\text{エ} \quad & \frac{3x+y}{2} - \frac{x+y}{3} \\ & = \frac{3(3x+y)}{6} - \frac{2(x+y)}{6} \\ & = \frac{9x+3y-2x-2y}{6} \\ & = \frac{7x+y}{6}\end{aligned}$$

$$\begin{aligned}\text{オ} \quad & \frac{18}{\sqrt{3}} - \sqrt{27} \\ & = \frac{18\sqrt{3}}{\sqrt{3}\sqrt{3}} - \sqrt{27} \\ & = 6\sqrt{3} - 3\sqrt{3} \\ & = 3\sqrt{3}\end{aligned}$$

087

$$x = \frac{7 \pm \sqrt{37}}{6}$$

$$3x^2 - 7x + 1 = 0$$

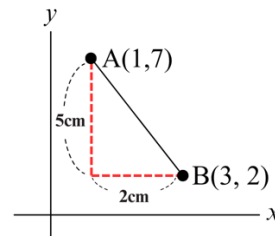
$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 3 \times 1}}{2 \times 3}$$

$$x = \frac{7 \pm \sqrt{49 - 12}}{6}$$

$$x = \frac{7 \pm \sqrt{37}}{6}$$

088

$$\sqrt{29}$$



089

$$C(6, 0)$$

A, B の x 座標を $y=x^2$ に代入して座標を求める

A(-3, 9) B(2, 4)

直線 AB の式を求める $y=-x+6$

C の y 座標は 0 なので、 $y=-x+6$ に代入

$x=6$

090

$$30\%$$

30m 以上 40m 未満の生徒は 12 人

$$\frac{12}{40} \times 100 = 30$$

Session 19

091

ア	-4
イ	-15
ウ	$\frac{6b^2}{a}$
エ	$\frac{11x-8y}{21}$
オ	$-\sqrt{6}$

$$\begin{aligned}\text{ア} &= 2-6 \\ &= 4\end{aligned}$$

$$\begin{aligned}\text{イ} &= 6 \times \frac{5}{3} - 5^2 \\ &= 10 - 25 \\ &= -15\end{aligned}$$

$$\begin{aligned}\text{ウ} &= -ab^2 \div \frac{2}{3} a^2b \times (-4b) \\ &= -ab^2 \times \frac{3}{2a^2b} \times (-4b) \\ &= \frac{6b^2}{a}\end{aligned}$$

$$\begin{aligned}\text{エ} &= \frac{2x+y}{3} - \frac{x+5y}{7} \\ &= \frac{7(2x+y)}{21} - \frac{3(x+5y)}{21} \\ &= \frac{14x+7y-3x-15y}{21} \\ &= \frac{11x-8y}{21}\end{aligned}$$

$$\begin{aligned}\text{オ} &= \sqrt{\frac{3}{2}} - \frac{\sqrt{54}}{2} \\ &= \frac{\sqrt{3}\sqrt{2}}{\sqrt{2}\sqrt{2}} - \frac{3\sqrt{6}}{2} \\ &= \frac{\sqrt{6}}{2} - \frac{3\sqrt{6}}{2} \\ &= -\frac{2\sqrt{6}}{2} \\ &= -\sqrt{6}\end{aligned}$$

092

$$x=7, -3$$

$$(x-2)^2 = 25$$

$$x^2 - 4x + 4 - 25 = 0$$

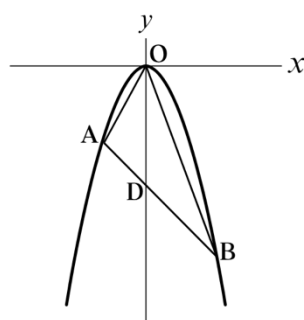
$$x^2 - 4x - 21 = 0$$

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

$$x=7, -3$$

093

$$3$$



点 A, B の座標を
 $y=-x^2$ から求める
A(-1,-1) B(2,-4)

直線 AB の式
 $y=-x-2$

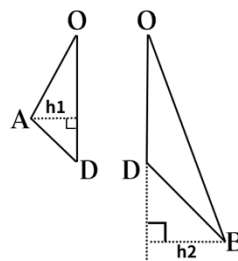
直線 AB と y 軸の交
点を D とする。

OD=2 底辺

△OAD の高さ $h_1=1$

△OBD の高さ $h_2=2$

注：単位は書かれていない
ので、 cm^2 としない。



094

$$\angle DEC = 92^\circ$$

$$\angle DOC = 36 \times 2 = 72^\circ \quad (\text{円周角} \times 2 = \text{中心角})$$

$$\angle ODB = 180 - (40 + 72) = 68^\circ$$

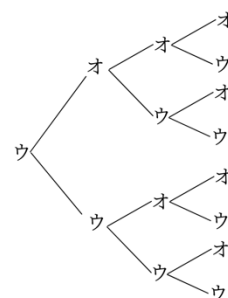
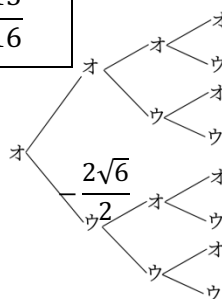
$$\angle CBO = 40 \div 2 = 20^\circ \quad (\text{中心角} \div 2 = \text{円周角})$$

$$\angle DEC = \angle OEB = 180 - (68 + 20) = 92^\circ$$

(三角形の内角の和) (対頂角)

095

$$\frac{15}{16}$$



Session 20

096

ア	-7
イ	-42
ウ	$\frac{8}{3}a^2$
エ	$-\frac{5}{24}y$
オ	$4\sqrt{6}$

$$\begin{aligned}\text{ア} &= -9 + 2 \\ &= -7\end{aligned}$$

$$\begin{aligned}\text{イ} &= -6^2 + 4 \div \left(-\frac{2}{3}\right) \\ &= -6^2 + 4 \times \left(-\frac{3}{2}\right) \\ &= -36 + (-6) \\ &= -42\end{aligned}$$

$$\begin{aligned}\text{ウ} &= 4a^2b \div \frac{3}{2}b \\ &= 4a^2b \times \frac{2}{3b} \\ &= \frac{8}{3}a^2\end{aligned}$$

$$\begin{aligned}\text{エ} &= \frac{3x-2y}{6} - \frac{4x-y}{8} \\ &= \frac{4(3x-2y)}{24} - \frac{3(4x-y)}{24} \\ &= \frac{12x-8y-12x+3y}{24} \\ &= -\frac{5}{24}y\end{aligned}$$

$$\begin{aligned}\text{オ} &= \frac{\sqrt{30}}{\sqrt{5}} + \sqrt{54} \\ &= \sqrt{6} + 3\sqrt{6} \\ &= 4\sqrt{6}\end{aligned}$$

097

$$x = \frac{21-7y}{3}$$

$$3x + 7y = 21$$

$$3x = 21 - 7y$$

$$x = \frac{21-7y}{3}$$

098

$$n = 15$$

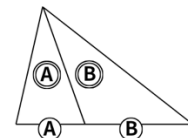
$$540 = 2 \times 2 \times 3 \times 3 \times 3 \times 5$$

n が 3×5 になると、

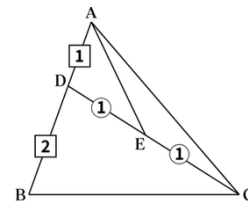
$$\sqrt{\frac{2 \times 2 \times 3 \times 3 \times 3 \times 5}{3 \times 5}} = 6$$

099

$$\triangle ABC : \triangle AEC = 6 : 1$$



高さが等しい三角形の面積比＝底辺の比



$\triangle AEC$ の面積を 1 とすると
 $\triangle ADC$ の面積＝2
 $\triangle CDB$ の面積＝ $\triangle ADC \times 2 = 4$
 $\triangle ABC$ の面積＝6

100

ア	ウ
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全数調査：すべてを調べる調査

標本調査：一部を選んで調べる調査

ア	中学生全員は多すぎる。 傾向が分かればよい。	標本調査
イ	1 票も間違えられない。 正確な結果が必要。	全数調査
ウ	視聴者全員は調べられない。 人気の傾向を知りたい。	標本調査
エ	部員全員を確認する必要がある。 漏れは許されない。	全数調査