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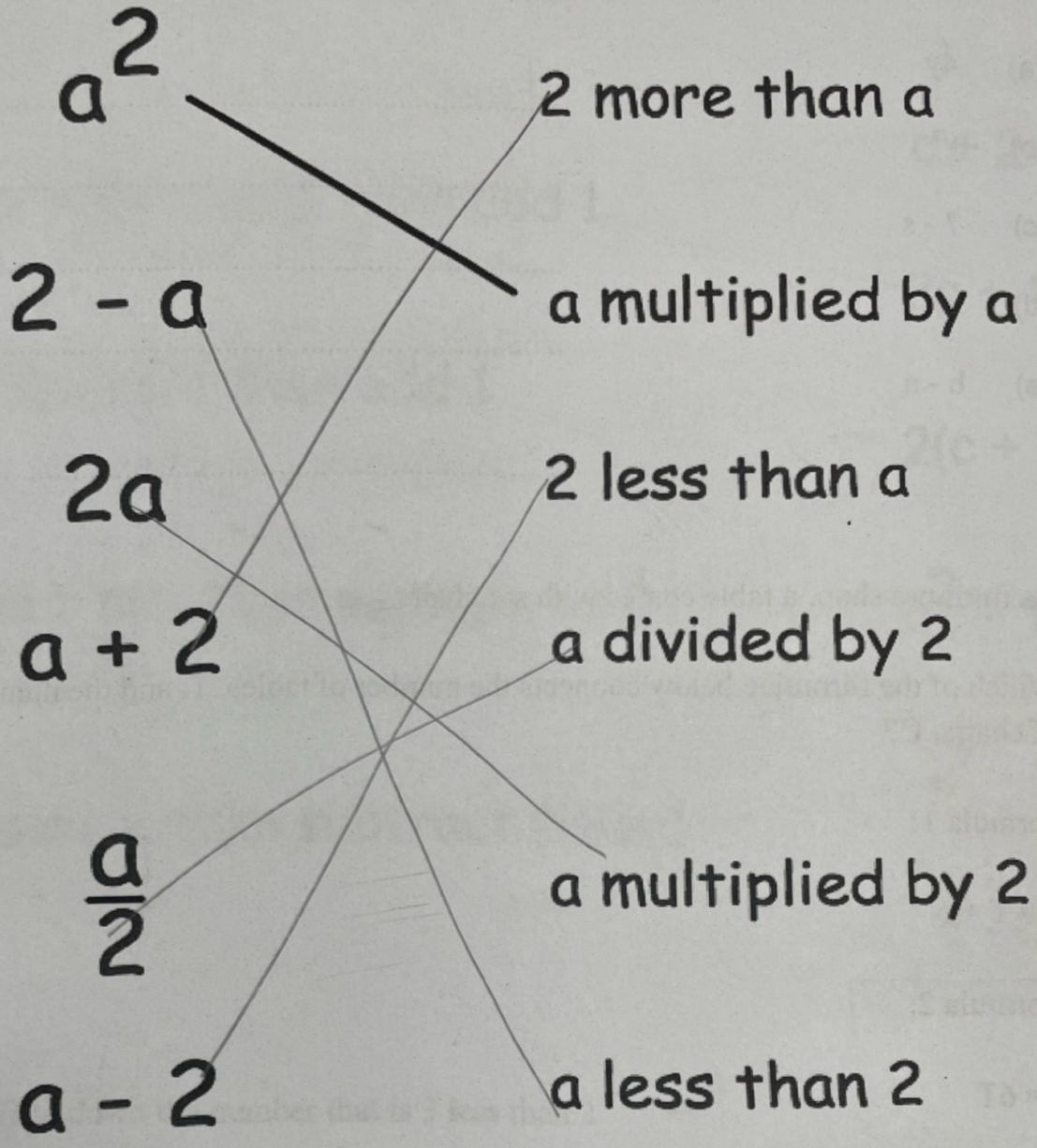
Model Answer

1. Match each expression to its definition.



2. Write down an algebraic expression for each of the following.

(a) 4 more than y — $y+4$

(b) 3 less than p — $p-3$

(c) 3 multiplied by y — $3y$

(d) 2 divided by a — $\frac{2}{a}$

(e) c divided by a — $\frac{c}{a}$

(f) c taken away from m — $m-c$

3. Explain the meaning of each of these expressions.

(a) $4y$ — Four multiply by y

(b) y^2 — y Squared

(c) $7 - s$ — Subtract S From 7

(d) xy — multiply x by y

(e) $b - a$ — subtract a from b

4. In a furniture shop, a table comes with six chairs.

Which of the formulae below connects the number of tables, T, and the number of chairs, C?

Formula 1:

$C = T + 6$

Formula 2:

$C = 6T$

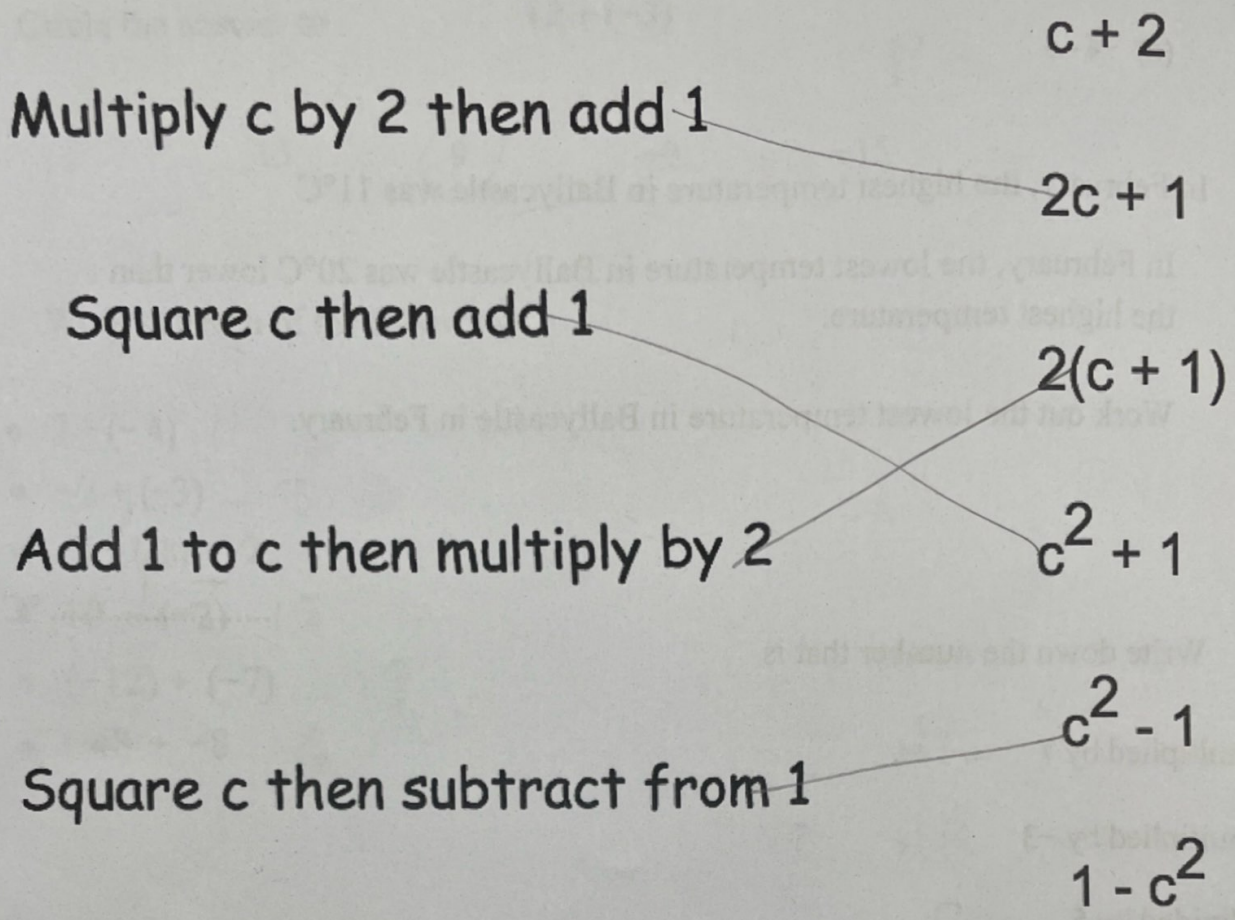
Formula 3:

$T = 6C$

Formula 4:

$T = C + 6$

5. Match each statement to the correct expression.



6. Write down the number that is 3 **less** than 2 −1

7. Write down the number that is

(a) 4 less than 1 − 3

(b) 2 more than −8 − 6

8. Circle the number than is 5 less than −9

14 4 −4 −14

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9. Write down the answer to

(c) $3 - 7$ -4

(d) $-4 - 5$ -9

10. In February, the highest temperature in Ballycastle was 11°C

In February, the lowest temperature in Ballycastle was 20°C lower than the highest temperature.

Work out the lowest temperature in Ballycastle in February.

-9 ..... °C

11. Write down the number that is

-2 multiplied by 7 -14

-8 multiplied by -3 24

-10 divided by 5 -2

-12 divided by -2 6

12. Circle the answer to

-4×4

(−16) −8 8 16

13. Write down the answer to

- $7 - 9 - 2$ -4
- $10 + 3 + 13$ 26
- $21 \div -7$ -3
- $-100 \div -4$ 25

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- $5 - 8 + 1$ -2
- -2×-7 14

14. Circle the answer to $\mathbf{12 + (-3)}$

15 9 −9 −15

15. Work out each of the following

- $7 - (-4)$ 11
- $-2 + (-3)$ -5
- $-6 - (-8)$ 2
- $10 - (-2)$ 12
- $(-12) + (-7)$ -19
- $-48 \div -8$ 6

16. Complete the following

$20 \div \boxed{-5} = -4$

$-7 - \boxed{3} = -10$

$5 + \boxed{-5} = 0$

$-6 \times \boxed{-6} = 36$

17. Emily has the following cards

−1	−4	2	−6	4	5

Emily is going to choose two cards and multiply the numbers on them.
What cards should Emily choose to make the largest possible answer?

−6 × −4

18. Fill in the missing numbers

(a)

−3 + 2 = −1

(b)

8 + −8 = 0

(c)

−8 − −11 = 3

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19. Fill in the missing numbers

$\boxed{2} \times \boxed{-8} = \boxed{-16}$

$\boxed{-1} \times \boxed{-2} = \boxed{2}$

$\boxed{-6} \times \boxed{-7} = \boxed{42}$

$\boxed{-45} \div \boxed{3} = \boxed{-15}$

$(-3)^2$ ..... 9 .....

$(-2)^3$ ..... −8 .....

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20. Expand the brackets.

- $y(y^2+3)$ y^3+3y
- $2w(3w^2-5)$ $6w^3-10$
- $y^2(8-2y)$ $8y^2-2y^3$
- $2(h-4)$ $2h-8$
- $5(2w+3)$ $10w+15$
- $3(2y-1)$ $6y-3$
- $6(3-2x)$ $18-12x$
- $2(3w-5y)$ $6w-10y$
- $y(3y+5)$ $3y^2+5y$
- $8x(2x-5)$ $16x^2-40$
- $-3(y+2)$ $-3y-6$
- $9e(2f-3)$ $18fe-27e$
- $-2(y-4)$ $-2y+8$
- $3(x+5)+2(x+1)$ $3x+15+2x+2 \Rightarrow 5x+17$
- $4(x-1)+3(2x+5)$ $4x-4+6x+15 \Rightarrow 10x+11$
- $2w(3w^2-5)$ $6w^3-10w$
- $y^2(8-2y)$ $8y^2-2y^3$
- $a(3a+2ac)$ $3a^2+2a^2c$
- $9w-(5-4w)$ $9w-5+4w \Rightarrow 13w-5$
- $2(7y-3x)-8(x-4y)$ $14y-6x-8x+32y$

$46y-14x$

3 6 8 14 16 28 41 64

(a) write down the cube numbers

8 and 64

(b) write down the cube root of 27.

$\sqrt[3]{27}$ 3

22. Write down the value of

(a) 1^3 1

(b) ten cubed 1000

(c) 5^3 125

(d) 6 cubed 216

(e) 8^3 512

(a) $\sqrt[3]{64}$ 4

(b) $\sqrt[3]{8}$ 2

(c) $\sqrt[3]{0}$ 0

(d) $\sqrt[3]{1000}$ 10

23. Arrange these in order, starting with the smallest.

2^2 = 4 $\sqrt[3]{27}$ = 3 1^3 = 1 $\sqrt{25}$ = 5

1^3, $\sqrt[3]{27}$, 2^2, $\sqrt{25}$

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24. 729 is both a square number and a cube number.

Find two other numbers that are both square numbers and cube numbers.

64 and 1

25. Don says

"the difference between two consecutive cube numbers is always odd."

Is Don correct? Yes
You must show your workings.

ex: $8-1=7$ odd

26. Make x the subject of

$\frac{y}{3} = \frac{3x}{3}$ $x = \frac{y}{3}$

$y = 3x - a$ $\frac{y+a}{3} = \frac{3x}{3}$ $x = \frac{y+a}{3}$

27. Make w the subject of the formula

$s = \frac{w}{a}$ $\times a$

$w = sa$

Make d the subject of

$e = d + 5$

$d = e - 5$

Rearrange this formula to make c the subject

$a = c - w$

$c = a + w$

Rearrange $t = \frac{w}{2}$ to make w the sub

$w = 2t$

Rearrange $2x - y + 1 = 0$ to make x the subject

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

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

Given that $x + y = 1$

What does y equal?

$y = 1 - x$

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$v = u + 10t$

(a) Work out the value of v when u = 4 and t = 3

$V = 4 + 10(3)$

$V = 4 + 30$

$V = 34$

(b) Make u the subject of the formula

$v = u + 10t$

$V - 10t = u$

(c) Make t the subject of the formula

$v = u + 10t$

$10t = V - u$

$t = \frac{V-u}{10}$

28. Isaac is rearranging $m = 3t - 8$ to make t the subject.

$m = 3t - 8$

$-8 \quad -8$

$m - 8 = 3t$

$\div 3 \quad \div 3$

$\frac{m-8}{3} = t$

$m + 8 = 3t$

$\frac{m+8}{3} = t$

Explain what mistake Isaac has made.

Subtracting the 8

Make m the subject of the formula

$s = \frac{hm}{4}$

$4s = hm$

$\frac{4s}{h} = m$

Express v in terms of t

$t = \frac{v}{4} + 1$

$t - 1 = \frac{V}{4}$

$4(t-1) = V$

Make d the subject of the formula $c = 4d + 5$

$c - 5 = 4d$

$\frac{c-5}{4} = d$

Make g the subject of the formula

$a = \sqrt{g}$

$a^2 = g$

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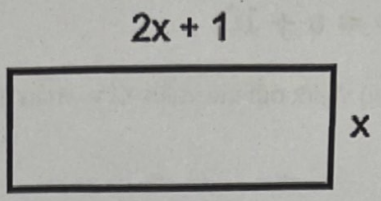
29. Here is a rectangle



P is the perimeter of the rectangle.

(a) Show that $P = 6x + 2$

$P = 2(2x+1+x)$

(b) Express x in terms of P

$P - 2 = 6x$

$\frac{P-2}{6} = x$

30. $C = 4x + 5y$

(a) Find the value of C when $x = 9$ and $y = -2$

$C = 4(9) + 5(-2)$ $C = 36 + -10$ $C = 26$

(b) Make x the subject of the formula

$C - 5y = 4x$ $x = \frac{C-5y}{4}$

(c) Find the value of x when $C = 51$ and $y = 3$

$x = \frac{51 - 5(3)}{4}$ $x = \frac{51-15}{4}$ $x = 9$

31. Simplify

- $7y + 10 + 3y - 9$ $10y + 1$
- $y + y + y - y$ $2y$
- $8x - 2x + 4x$ $10x$
- $4c - 6c$ $-2c$
- $6y - 5 + 2y$ $8y - 5$
- $8c + 2p - 2c + 4p$ $6c + 6p$
- $3x + 4 - x + 7$ $2x + 11$
- $6a + 5w - 2a + w$ $4a + 6w$
- $5c - 3s + 3c + 7s$

$8c + 4s$

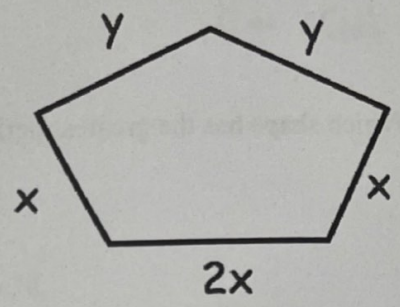
Troy is simplifying $x^3 + x^3$

He says the answer is $2x^6$

Explain why Troy is wrong.

adding The Indices = x^6

33. Shown is a pentagon.



Find an expression, in terms of x and y, for the perimeter of the pentagon.

P = 2x + x + x + y + y => P = 4x + 2y

34. Simplify fully

$2x^2 + 3x - 1 - x^2 + 2x - 5$ $x^2 + 5x - 6$

$9(y-2) + 4y + 3$ $9y - 18 + 4y + 3$, $13y - 15$

$5(x + 3y) + 2(2x - y)$ $5x + 15y + 4x - 2y$; $9x + 13y$

$3(4x + 8) - (7x - 2)$ $12x + 24 - 7x + 2$, $5x + 26$

$3(4x - 1) - 2(x + 4)$ $12x - 3 - 2x - 8$, $10x - 11$

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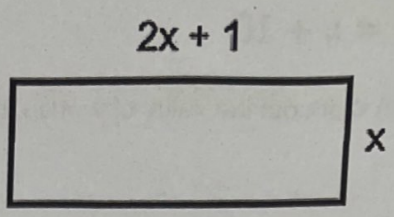
29. Here is a rectangle



P is the perimeter of the rectangle.

(a) Show that $P = 6x + 2$

$P = 2(2x+1+x)$

(b) Express x in terms of P

$P - 2 = 6x$

$\frac{P-2}{6} = x$

30. $C = 4x + 5y$

(a) Find the value of C when $x = 9$ and $y = -2$

$C = 4(9) + 5(-2)$ $C = 36 + -10$ $C = 26$

(b) Make x the subject of the formula

$C - 5y = 4x$ $x = \frac{C-5y}{4}$

(c) Find the value of x when $C = 51$ and $y = 3$

$x = \frac{51 - 5(3)}{4}$ $x = \frac{51-15}{4}$ $x = 9$

31. Simplify

- $7y + 10 + 3y - 9$ $10y + 1$
- $y + y + y - y$ $2y$
- $8x - 2x + 4x$ $10x$
- $4c - 6c$ $-2c$
- $6y - 5 + 2y$ $8y - 5$
- $8c + 2p - 2c + 4p$ $6c + 6p$
- $3x + 4 - x + 7$ $2x + 11$
- $6a + 5w - 2a + w$ $4a + 6w$
- $5c - 3s + 3c + 7s$

$8c + 4s$

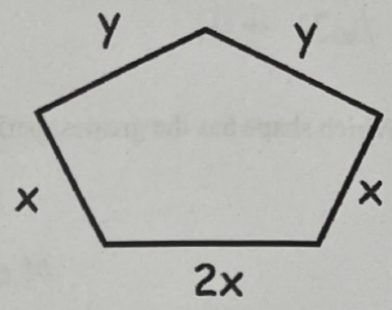
32. Troy is simplifying $x^3 + x^3$

He says the answer is $2x^6$

Explain why Troy is wrong.

adding The Indices = x^6

33. Shown is a pentagon.



Find an expression, in terms of x and y, for the perimeter of the pentagon.

P = 2x + x + x + y + y ⇒ P = 4x + 2y

34. Simplify fully

$2x^2 + 3x - 1 - x^2 + 2x - 5$ $x^2 + 5x - 6$

$9(y-2) + 4y + 3$ $9y - 18 + 4y + 3$, $13y - 15$

$5(x + 3y) + 2(2x - y)$ $5x + 15y + 4x - 2y$, $9x + 13y$

$3(4x + 8) - (7x - 2)$ $12x + 24 - 7x + 2$, $5x + 26$

$3(4x - 1) - 2(x + 4)$ $12x - 3 - 2x - 8$, $10x - 11$

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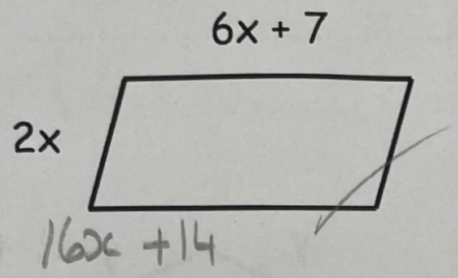
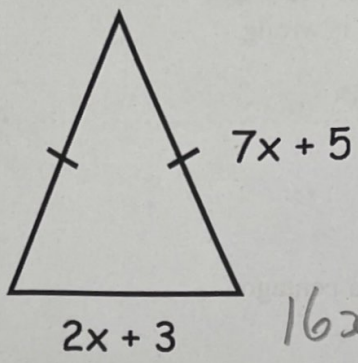
35. Below is a parallelogram and an isosceles triangle



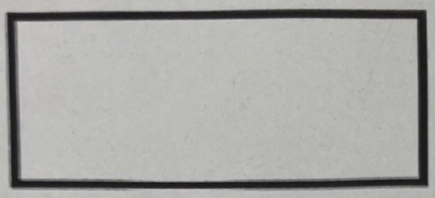


Which shape has the greatest perimeter? Show your working

36. Work out

- 0.8 x 1.2 = 0.96
- 5.18 ÷ 7 = 0.74
- 0.3 x 0.2 = 0.06
- 16.44 ÷ 0.3 = 54.8
- 0.3 x 0.3 = 0.09
- 0.06 x 0.4 = 0.024
- 12.4 x 0.7 = 8.68
- 75.2 x 0.23 = 17.296
- 14.04 ÷ 6 = 2.34
- 120 ÷ 0.3 = 400
- 0.845 ÷ 5 = 0.169
- 1.72 ÷ 0.8 = 2.15
- 5 ÷ 0.04 = 125

37. Shown below is a rectangle



8.2 X 3.6

82 X36 = 29.52 cm²

Find the area of the rectangle.Include units.

38. State whether each answer is more than 20 or less than 20.

Write "more than" or "less than" for each.

(a) 20×0.8 Less

(b) $20 \div 0.8$ Less

(c) 0.2×200 more

(d) $0.2 \div 200$ Less

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39. You are given that

358 x 26 = 9308

Use this information to find the answers to

(a) 3580 x 260 930800

(b) 3.58 x 2.6 9.308

(c) 3580 x 0.26 930.8

(d) 93080 ÷ 2.6 35800
x10 x10

40. Factorize the following Expressions

(a) 4x + 6 2(2x+3)

(b) 15x + 20 5(3x+4)

(c) 9y – 12 3(3y-4)

(d) 5x + 15 5(x+3)

(e) 6x – 3 3(2x-1)

(f) 4x + 8 4(x+2)

(g) 5y – 25 5(y-5)

(h) 8w + 24 8(w+3)

(i) 8cdf + 10cde 2cd(4f+5e)

(j) $7w^2+6w+wy$ w(7w+6+y)

(k) $8ab^2 - 10ab$ 2ab(4b-5)

(l) $4xy^2+6xy+2x^2y$ 2xy(2y+3+x)

(m) 6 – 4x 2(3-2x)

(n) 9 + 12y 3(3+4y)

(o) 45 + 60x 5(9+12x)

(p) 16y – 32 16(y-2)

41. Find the mistake

Factorise completely

$24x^2 + 20x$

$4x(6x+5)$

$4(6x^2 + 5x)$

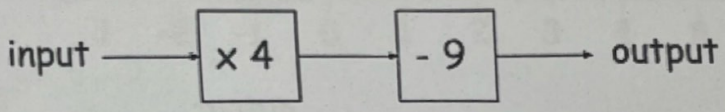
Factorise completely

$20a^2c + 30ac$

$10ac(2a+3)$

$5ac(4a^2 + 6)$

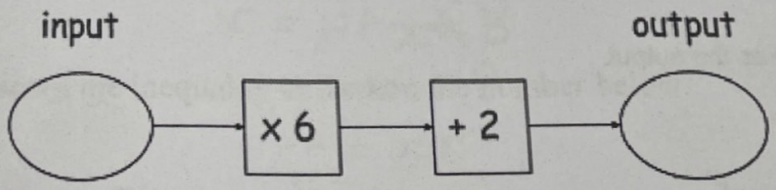
42. Below is a number machine.



Work out the output when the input is 6 15

Work out the input when the output is 35 11

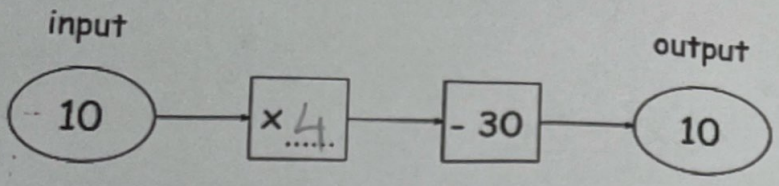
43. Here is a number machine.



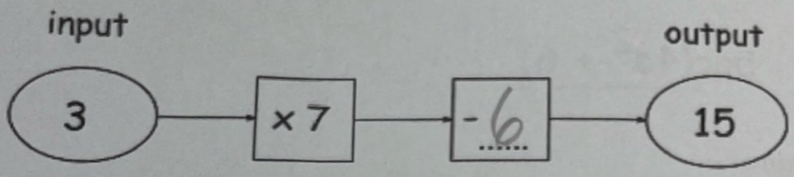
Work out the output when the input is 13 80

Work out the input when the output is 5 0.5

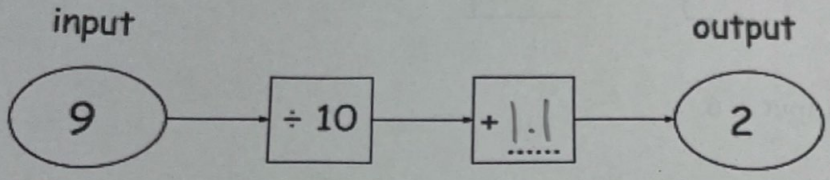
(a)



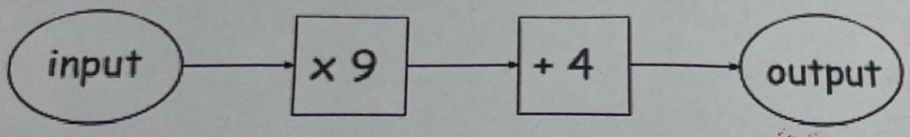
(b)



(c)



45. Below is a number machine



The input is the same as the output.

Work out the input

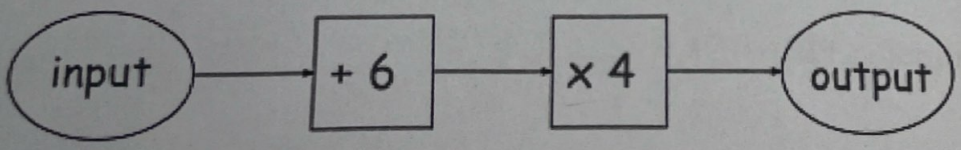
$9x + 4 = x$

$9x - x = -4$

$8x = -4$

$x = \frac{-4}{8}$

$x = -\frac{1}{2}$



The output is twice the input.

$4(x + 6) = 2x$

Work out the input

$4x + 24 = 2x$

$2x = -24$

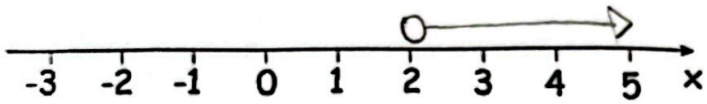
$\frac{2x}{2} = \frac{-24}{2}$

$x = -12$

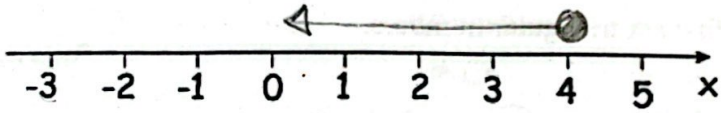
46. Match each inequality to the correct description

$x > 4$	x is less than or equal to 4
$x \leq 4$	x is less than 4
$x < 4$	x is greater than 4
$x \geq 4$	x is greater than or equal to 4

47. Represent the inequality $x > 2$ on this number line



48. Represent the inequality $x \leq 4$ on this number line



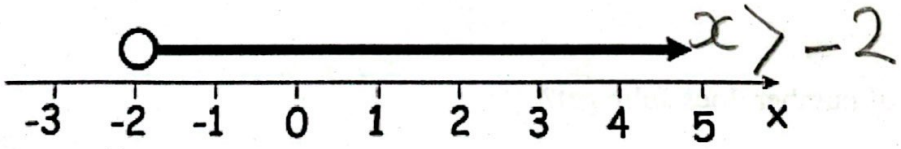
49. a) Solve the inequality $2x - 1 < 9$

$2x < 9+1$

$2x < 10$

$x < 5$

b) Write down the inequality shown on the number below.



c) Write down all the integers that satisfy both inequalities shown in part (a) and (b).

$x = 4, 3, 2, 1, -1$

$5 > x > -2$

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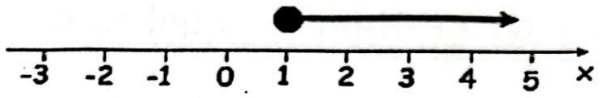
50. (a) n is an integer

$-2 < n \leq 3$

List the possible values of n. $-1, 0, 1, 2, 3$

(b)



$1 \leq x$

Write down the inequality shown in the diagram.

(c) Solve $3y - 4 > 17$

$3y > 17 + 4$

$3y > 21$

$y > 7$

51. List the first six triangular numbers.

1, 3, 6, 10, 15, 21

52. John is adding consecutive triangular numbers.

John says, "when I add consecutive triangular numbers, I get another kind of special number."

$10 + 15 = 25$

What kind of number does John get?

square number

53. Work out

(a) 23×10^2
2300

$4000 \div 10^2$
40

8×10
80

$70 \div 10$
7

(b) 7×10^3
7000

$25000 \div 10^3$
25

6×100
600

$6000 \div 100$
60

(c) 2.5×10^3
2500

$170 \div 10^2$
1.7

17×1000
17000

$17 \div 10$
1.7

(d) 1.8×10^4
18000

$9300 \div 10^4$
0.93

3.4×10
34

$93 \div 100$
0.93

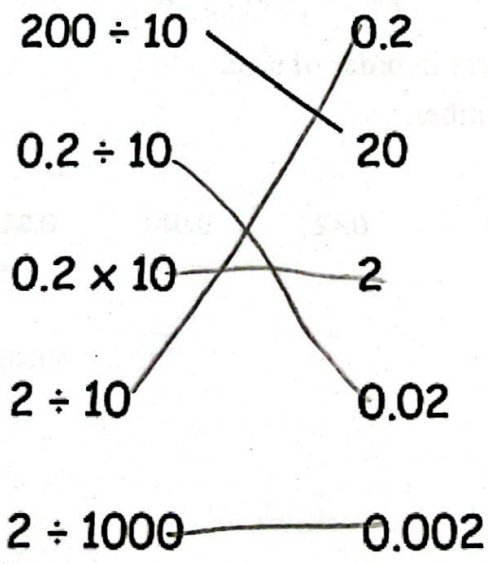
(e) 0.2×10^2
20

$98 \div 10^2$
0.98

0.2×100
20

$28900 \div 1000$
28.9

54. Shown below are some questions and answers



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55. The heights of 7 children are shown below

1.32m 0.098m 1.16m

132cm	1.2m	98cm	0.99m	116cm	1.4m	1.33m

(a) Change 132cm into metres. ×100 1.32m

(b) Change 98cm into metres. 0.098m

(c) Order the heights, starting with the shortest.

98cm, 0.99m, 116cm, 1.2m, 132cm, 1.33m, 1.4m

56. Five boys take part in a long jump competition. The distances jumped were

4.31m	4.08m	4.1m	4.093m	4.51m

(a) Write down the distance of the longest jump 4.51m

(b) Put the jumps in order, starting with the shortest.

4.08m, 4.093m, 4.1m, 4.31m, 4.51m

57. Write these numbers in order of size.
Start with the smallest number.

5	3	1	4	2
4.2	0.42	0.024	0.93	0.039

58. Calculate

- $16 - 5 \times 2$ (10) 6
- $5 \times (2 + 3)$ (5) 30
- $10 - 3^2$ 1
- $40 \div 2 + 3$ 23
- $8 \div 2 + 12 \div 4$ (4, 3) 7
- $3 \times 10 \div 5 - 1$ 29
  30 ÷ 5 - 1

59. Express as a product of its prime factors

36 $2 \times 2 \times 3 \times 3$ $2^2 \times 3^2$

56 $2 \times 2 \times 2 \times 7$ $2^3 \times 7$

100 $2 \times 2 \times 5 \times 5$ $2^2 \times 5^2$

42 $2 \times 3 \times 7$

60. $\frac{3x^2}{3} = \frac{75}{3}$

Find the value of x.

$x^2 = 25$

$x = 5$

Express 75 as a product of its prime factors.

3×5^2

61. Write to one significant figure.

236	200
74.86	70
6793	7000
0.0683	0.07
9.99	10

62. Write to two significant figures.

17635	18000
0.1826	0.18
0.0001921	0.00019
0.123456	0.12

63. Holly has worked out the answer to a calculation.
Her teacher has told her to write all her answers to four significant figures.
Round her answer to four significant figures

827.4715 827.5

64. Ava thinks of a number. 12 36
She multiplies it by 3. □ × 3 = □ + 9 = 45
Then she adds 9.
Her answer is 45

What was the number Ava started with?

65. Harry thinks of a number. 52 13 12
He divides his number by 4. □ ÷ 4 = □ − 1 = □ × 6 = 72
Harry then subtracts 1.
He then multiplies his result by 6. His final answer is 72.

What was the number Harry first thought of?

66. Jonathan thinks of a number. -8 56
He multiplies it by −7 and then subtracts 5 His answer is 51 □ × −7 = □ − 5 = 51

Was number is he thinking of?

67. Hannah and Frankie think of the same number.
Hannah divides her number by 7 and then adds 3.
Her answer is 6. Frankie subtracts 9 and then squares.
Her final answer is x. 21 3
H = □ ÷ 7 = □ + 3 = 6

Find Frankie's final answer, x

= 144

68. Apples cost a pence each.
Bananas cost b pence each.
Write down an expression for the total cost, in pencil, of 3 apples and 5 bananas.

$3a+5b$ pence

69. Martin is x years old.
Jennifer is 3 years younger than Martin.
Connor is twice as old as Martin.

(a) Write an expression for Jennifer's age.

$x-3$

(b) Write an expression for Conner's age.

$2x$

(c) Write an expression for the sum of the three ages

$x+2x+x-3$ $\quad 4x=3$

$4x-3$

70. The express bus from Dublin to Belfast takes x minutes.
The standard bus takes 29 minutes longer.

Write down an expression for the time the standard bus takes

$x+29$

71. Fred is 21 years old.
Hannah is y years younger than Fred.

Write an expression for Hannah's age

$21-y$

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72. Evaluate

$\frac{1}{16} = 4^{-2} = \frac{1}{4^2}$ $\quad 36^{\frac{1}{2}} = \sqrt{36} = 6$ $\quad 25^0 = 1$ $\quad 5^{-3} = \frac{1}{5^3} = \frac{1}{125}$ $\quad 2^4 \times 4^{-2} = 16 \times \frac{1}{16} = \frac{16}{16} = 1$

73. w is greater than 1. Write in order from smallest to largest

w^0 (3) $\quad w^3$ (4) $\quad \frac{w^3}{w^4}$ (2) $\quad w^{-2}$ (1)

74. Write the numbers below in the form 2^n

$2^2 = 4$ $\quad 2^3 = 8$ $\quad 2^5 = 32$

75. Calculate

- $9^3 = 729$
- $2^4 = 16$
- $10^6 = 1000000$
- $1^7 = 1$

76. A red light flashes every 6 seconds.
A yellow light flashes every 4 seconds.
They both flash at the same time. After how many seconds will they next both flash at the same time?

12 seconds

77. A blue light flashes every 8 minutes while a pink light flashes every 54 minutes. Both lights flash together at 2pm. When is the next time that both lights will flash together again?

.....

78. From the list of numbers

7 9 12 21 23 30 36 45

(a) write down the multiples of 7.

7, 21

(b) write down the multiples of 5.

30, 45

(c) write down the multiples of 12.

12, 36

79. Find the value of

- 5c + c when c = 6 36
- 4a − b a = 9 b = 8 28
- 12h + 9t when h = 11 and t = 3 159
- 3c + m when m = 0.5 and c = 2.2 7.1
- $\frac{ab+24}{2c}$ a = 4, b = 9 and c = -5 −6

$\frac{4\times9+24}{2\times-5}$ $\frac{36+24}{-10}$ 27

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80. Solve

$x^2 = 9$ x = -3 or x = 3

$x^2 = 100$ -10 , 10

$x^2 + 7 = 32$ $x^2 = 32 - 7$ $x^2 = 25$ $x = 5$

$x^2 - 2 = 119$ $x^2 = 119 + 2$ $x^2 = 121$ $x = 11$

81. Matt says that the only answer to x squared = 4 is x = 2
Explain why Matt is wrong

or -2

82. The area of a square is 169cm²
Walter says that the length of each side is 13cm or −13cm
Explain why Walter is incorrect

length cannot be in -ve

83. Simplify

$m^5 \times m^3$

m^8

$m^8 \div m^2$

m^6

$\frac{m^9 \times m^1}{m^5}$ $\frac{m^{10}}{m^5}$ =

$(m^3)^2$

m^6

$w^3 \times w^{-5}$

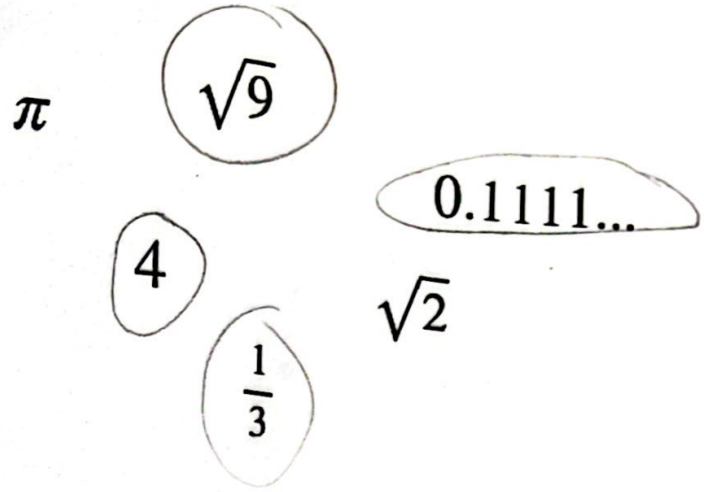
w^{-2}

$a^6 \div a^3$

m^3

$\frac{s^3 \times s^4}{s^2}$ $\frac{s^7}{s^2}$

s^5



85. Write down an irrational number.

answers vary

86. A rational number can be expressed in the form $\frac{a}{b}$ where a and b are integers. Explain why the following numbers are rational numbers.

any eq. fraction.

$\frac{82}{100}$ 0.82 12 $\frac{-24}{2}$ 1.33333333... = 1.3 $\frac{4}{3}$

87. Consider the following numbers.

~~-3~~ ~~12~~ 8.39 -56.1 ~~8~~ ~~0~~ $11\frac{1}{3}$

a) Natural numbers 12 , 8

b) Integers 0, -3,

c) Rational numbers 8.39, -56.1 , $11\frac{1}{3}$