Strathaven Academy

Level 3 – Unit 6

Homework

- Algebra – Distributive Law
- Equations
- Statistics – Pie Charts
- Probability
- Fractions

Algebra – Distributive Law

1. **Simplify** the following :-

a $y + y$ **b** $a \times a$ **c** $7m \times n$ **d** $6q \times 7r$

e $7p + 2q - p - 5q$ **f** $g \times g \times g$ **g** $3x^2 \times 5x$ **h** $16a^2 \div 8a$.

2. Find the value of these expressions when $x = 3$, $y = 2$ and $z = -4$.

a $4x + y$ **b** $3y - x$ **c** $x^2 + z^2$

d xyz **e** $(y - z)^2$ **f** $2y^2$

g $\dfrac{z - y}{x}$ **h** $\dfrac{yx^2}{z - 2}$ **i** $\sqrt{x^2 + y^2 + z}$.

3. Multiply out the brackets :-

a $2(5x + 1)$ **b** $6(3x - 4y)$ **c** $p(p + 4)$ **d** $4a(2a - 5b)$

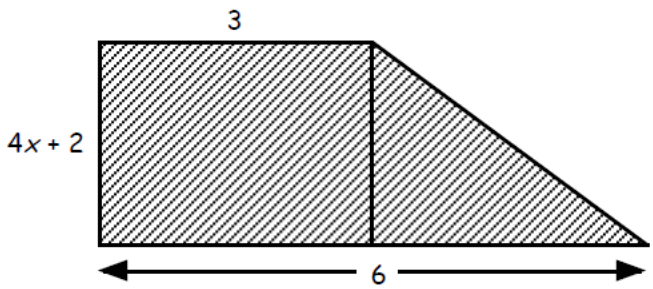
e $-6(w - 1)$ **f** $-x(x - 2y)$ **g** $-4p(2 - p)$ **h** $-x^2(x - 5y)$.

4. Multiply out the brackets and **simplify** :-

a $2(x + 5) - 9$ **b** $3a + 2(a - 4)$ **c** $10 + 2(x - 5)$

d $3(p + 3) + 4(p - 3)$ **e** $2(5x - 1) - 4(x - 2)$ **f** $2w - (3 - w)$.

5. This shape is made up of a rectangle and a right angled triangle.



Write down an expression for the **total area** of the shape, in terms of x.

Equations

1. Find the value of x in these equations :-

a $x + 12 = 21$ **b** $3 - x = -4$ **c** $6x = 21$

d $8x + 34 = 0$ **e** $9x - 1 = 53$ **f** $4x + 200 = 100$.

2. Solve each of the following equations :-

a $6x - 4 = 5x + 9$ **b** $7x + 7 = 5x + 11$ **c** $9x - 6 = 5x + 14$

d $8x + 2 = 4x + 20$ **e** $15x = 4x - 55$ **f** $16x - 45 = x$.

3. Solve these equations :-

a $2(x + 4) = 22$ **b** $3(4x - 4) = 60$ **c** $6(1 + 8x) = 54$

d $5(x - 6) - x = 0$ **e** $4(x + 2) - 2(x - 5) = 30$ **f** $7(2x - 1) = 4x + 23$.

4. Solve each of the following **inequalities**, leaving your answer in the form $x < 5$, $x \geq 2$ etc.

a $x - 5 < 9$ **b** $8x \leq 56$ **c** $7x - 4 > 31$

d $2(x + 6) \geq 40$ **e** $5(2x - 1) < 35$ **f** $10x - 1 \geq 7x + 17$.

5. Solve these equations and inequalities :-

a $\frac{1}{2}x = 8$ **b** $\frac{1}{3}x - 5 = 3$ **c** $\frac{1}{4}x - 1 > 1$

d $\frac{1}{2}(4x - 10) = 1$ **e** $\frac{1}{8}(x - 16) \leq 0$ **f** $\frac{1}{2}(5x + 8) < \frac{1}{2}x$.

6. Harry bought 2 boxes of pencils to go with the 100 loose ones he already had.

Barry wanted to have the **same** number of pencils as Harry.

He had 10 loose pencils and had to buy 8 boxes to do so.

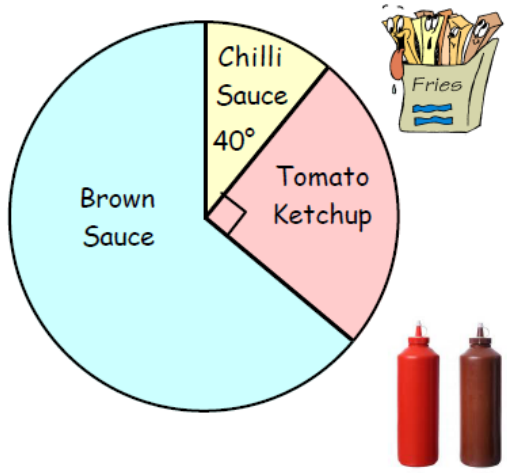
a Construct an equation to show this information.

(Let x represent the number of pencils in a box).

b Solve the equation to find how many pencils there are in a box.

Statistics – Pie Charts

1. In a supermarket survey, 720 people were asked which of three flavours of sauce they prefer over their fries.



The results are shown in the pie chart.

a What **angle** at the centre is taken up by Brown Sauce ?

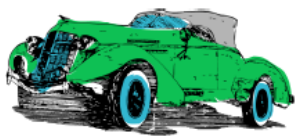
b **How many** people preferred :-

(i) Tomato Ketchup **(ii)** Chilli Sauce ?

c How many people preferred Brown Sauce ?

2. The table shows one month's sales from a car showroom.

Make of Car	Number	Fraction	Angle
Ford	10	$\frac{10}{20}$	
Vauxhall	6		
Seat	3		
BMW	1		
TOTAL	20	1	360°



a Copy and complete the table.

b Construct a neat accurate **pie chart** to show the information.

Probability

1. For each statement below, say whether the probability of it happening is :-

impossible - unlikely - evens - likely - certain.

(a) If today is Sunday, yesterday was Tuesday.

(b) The next person I see will be female.

(c) I will score 100% in a difficult Maths test.

2. There are 52 cards in a deck.
If I choose one without looking, what is the probability it will **not** be a face card ?
(*King, Queen or Jack*).

3. An eight sided dice is thrown.
Find :-

(a) P(3)

(b) P(even)

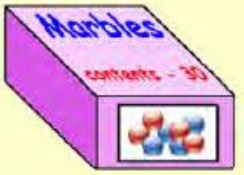
(c) P(prime)

(d) P(ten).

4. The probability of an event not happening is calculated as 0·45.

What is the probability of the event happening ?

5. A box contains some red and blue marbles. There are a total of thirty marbles and there is a 40% probability of picking a red at random.



(a) How many blue marbles are in the box ?

(b) How many red marbles do I need to add to the box so that there is an evens chance of picking a red at random ?

6. There are 49 balls in the lottery.
The following balls were drawn :-

2, 12, 23, 37 and 45.

For the remaining balls, find :-

(a) P(3) (b) P(12)

(c) P(odd) (d) P(>40).

7. Two boxes have green and red balls.

Box 1 : 13 green and 6 red balls
Box 2 : 11 green and 5 red balls.

Which box would you choose so that you would have a better chance of picking out a red ball ?
(*Justify your answer*).

Fractions

1. Change to a mixed number :- (a) $\frac{29}{5}$ (b) $\frac{46}{8}$ (c) $\frac{76}{10}$.

2. Re-write as a top-heavy fraction :- (a) $5\frac{2}{3}$ (b) $6\frac{3}{5}$ (c) $10\frac{7}{9}$.

3. How many $\frac{1}{3}$ pizza slices can by sold from $4\frac{2}{3}$ pizzas ?

4. Copy and complete :-

(a) $\frac{5}{7} + \frac{1}{7}$ (b) $\frac{3}{4} - \frac{1}{2}$ (c) $\frac{5}{8} - \frac{1}{8}$ (d) $2\frac{2}{5} + 3\frac{4}{5}$

(e) $\frac{5}{6} - \frac{1}{4}$ (f) $4\frac{4}{5} + 1\frac{2}{3}$ (g) $5\frac{7}{8} - 2\frac{3}{5}$ (h) $3\frac{1}{2} - 1\frac{2}{3}$.

5. Copy and complete :-

(a) $\frac{1}{2} \times \frac{3}{5}$ (b) $\frac{7}{9} \times \frac{2}{3}$ (c) $\frac{3}{7} \times \frac{21}{9}$ (d) $\frac{5}{11} \times \frac{33}{35}$

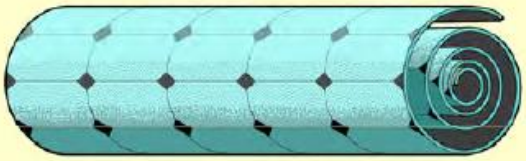
(e) $\frac{1}{2} \times 4\frac{1}{2}$ (f) $\frac{1}{3} \times 6\frac{2}{3}$ (g) $3\frac{1}{2} \times 1\frac{1}{5}$ (h) $6\frac{3}{4} \times 1\frac{7}{9}$.

6. Before going on his diet, Antonio weighed $14\frac{1}{2}$ stones.

He lost $3\frac{3}{4}$ stones on his diet.

What did Antonio then weigh ?

7.



A 1 metre length of this linoleum weighs $3\frac{3}{5}$ kg.

What will the weight of a $2\frac{3}{4}$ metre length be ?

8. An empty wooden crate weighs $3\frac{3}{8}$ kg.

It holds 6 bags of ready mix cement.

Each bag weighs $2\frac{3}{4}$ kg.

Calculate the total weight of the crate and the 6 bags.

9.

The length of this rectangular lawn is $3\frac{1}{5}$ m.

Its breadth is $3\frac{3}{4}$ m.

How many packets of feeding will be needed to cover it if one packet covers 4 square metres ?

10. Find :- $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10}$. *(This should only take about 10 seconds !).*

Strathaven Academy

Level 3 – Unit 6

Revise and Review

- Algebra – Distributive Law
- Equations
- Statistics – Pie Charts
- Probability
- Fractions

This section provides further examples that may be used to revise prior to the Unit 6 Test or for consolidation and review as required on completion of the unit.

Algebra – Distributive Law

1. Simplify :-

(a) $3x + 4x$ (b) $6x + 3x - 8x$ (c) $8 \times k$ (d) $2p \times 5$

(e) $g \times 10$ (f) $3t \times t$ (g) $4p \times 3p$ (h) $2k \times 3k \times 4k$.

2. Multiply out each bracket :-

(a) $3(x + 40)$ (b) $6(y - 3)$ (c) $9(2x + 4)$ (d) $12(3b - 5)$

(e) $a(a + 1)$ (f) $3k(2k - 4)$ (g) $-3g(4 + 2g)$ (h) $-w(4 - 3w)$.

3. Multiply out each bracket and simplify :-

(a) $3(x + 1) + 4$ (b) $4(2y + 5) - 15$ (c) $6 + 2(3e - 3)$

(d) $13 - 4(3 - 2t)$ (e) $3x(x + 1) - 3x$ (f) $12y - 3y(2y - 4) + 3y^2$

(g) $2(b + 3) + 3(2b - 1)$ (h) $5(2a + 6) - 2(4a + 15)$ (i) $5a(a + 3) - 2a(2a + 5)$.

4. Find the value of each expression when $a = -1$, $b = 2$, $c = 3$, $d = 4$ and $e = -2$:-

(a) $b + c + e$ (b) $ab + cd$ (c) $2b + 3c - 4e$ (d) $abcde \div 4$

(e) $a^2 + b^2 + c^2$ (f) $a^2 - b^2$ (g) $(ab + cd)^2 - e^2$ (h) $\sqrt{(ae)^2 - c}$.

Equations

1. Find the value of x in the following equations (*Show each step of working carefully*)

(a) $x + 5 = 19$ (b) $x - 40 = 10$ (c) $9x = 54$

(d) $2x = 17$ (e) $10x = 5$ (f) $4x + 1 = 21$

(g) $9x - 6 = 30$ (h) $2x + 7 = 14$ (i) $3x - 2 = -11$

(j) $5x + 1 = 3x + 7$ (k) $7x - 1 = 4x + 14$ (l) $9x = 3x + 42$

2. Don had 9 packets of toffos. He gave 2 packets to Emma, who also had 25 loose toffos.

They discovered that they then had exactly the same number of toffos.

(a) Make up an equation to show this information.

(*let x be the number of toffos in 1 packet*)

(b) Solve the equation to determine how many toffos there are in each packet.

3. Solve these equations :-

(a) $3(x + 5) = 36$ (b) $8(x - 3) = 40$

(c) $2(3x + 1) = 38$ (d) $9(2x - 8) = 0$

(e) $5(3x - 2) = 5x$ (f) $8(2x - 1) = 4x + 16$

(g) $8(x + 2) - 6x = 21$ (h) $5(2x - 1) + 3(1 + x) = 37$

4. Multiply each term by the l.c.m. of the denominators to dispose of the fractions and solve :-

(a) $\frac{1}{2}x - 5 = 4$ (b) $\frac{1}{2}x + \frac{1}{3} = 3$

(c) $\frac{x + 2}{5} - 2 = 0$ (d) $\frac{x - 1}{4} - \frac{x + 1}{10} = 1$

5. Solve the following inequalities :-

(a) $x + 8 > 11$ (b) $x - 12 \leq 12$ (c) $x - 32 \geq 0$

(d) $4x < 64$ (e) $2x + 18 > 24$ (f) $3(2x + 1) \leq 33$

(g) $3(2x - 4) \geq 5x + 17$ (h) $2(3x + 1) < 4x - 2$ (i) $6(2x - 4) \leq 9x$

Statistics – Pie Charts

1. The table shows the results of a questionnaire asking a group of 90 pupils their favourite bedtime drink.

   (a) **COPY** and complete the table.

   (b) Construct an accurate pie chart using a pair of compasses, a protractor and the table information.

Drink	Number	Fraction	Angle
Water	10	$\frac{10}{90}$	$\frac{10}{90} \times 360 = 40°$
Chocolate	15	$\frac{15}{90}$	$\frac{15}{90} \times 360 = ...°$
Milk	30	$\frac{.....}{90}$	$\frac{.....}{90} \times 360 = ...°$
None	35	$\frac{.....}{90}$	$\frac{.....}{90} \times 360 = ...°$
TOTAL	**90**	**1**	**360°**



2. For each table below, construct an accurate pie chart, showing all your working.

(a)

Favourite pet	Number
Cat	20
Dog	10
Mouse	12
Rabbit	18
TOTAL	....

(b)

People's weight (kg)	Number
30 - 50	80
51 - 70	120
71 - 90	480
91 - 110	40
TOTAL	....

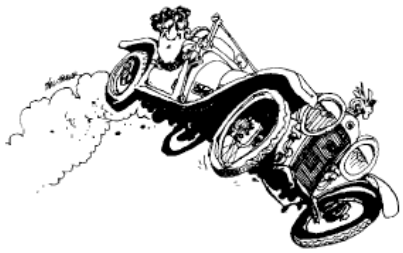
3. The table shows the results of a survey asking how old people were when they first went to the cinema.

9	8	6	7	5	6	9	5	6	5	5	6
5	9	7	6	9	7	6	9	9	6	5	5
5	6	7	6	8	6	8	7	6	6	8	6

Construct a **pie chart** to show this information.

Probability

1. State the likelihood of each statement :-



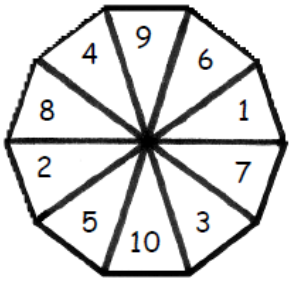
(a) All cars will be able to fly tomorrow.

(b) If today is Monday, tomorrow will be Tuesday.

(c) Toss a coin, it lands tails.

(d) We will play outside next week during the P.E. class.

2.



A ten sided dice numbered 1 to 10 is thrown.
Find :-

(a) P(even) (b) P(less than 3)

(c) P(prime) (d) P(square number).

3. A toy box contains building bricks.

There are 3 green, 1 black, 9 blue, 12 orange, and 15 white bricks.

Find :-

(a) P(green) (b) P(blue) (c) P(orange) (d) P(white)

(e) P(black) (f) P(not orange) (g) P(white or blue) (h) P(red).

4.

Paul and Peter each toss a coin and record the results.

Paul : H H T H T H H H T T H H T H T H T H H T T

Peter : H T H H T H H T T H T H ... ...

If the probability of heads to tails was the same for both boys, what were Peter's last two tosses ?

Fractions

1. Change to a mixed number :-

   (a) $\frac{22}{7}$ (b) $\frac{83}{3}$

2. Change to a top heavy fraction :-

   (a) $4\frac{1}{4}$ (b) $10\frac{2}{9}$

3. Copy and complete :-

   (a) $\frac{2}{5} + \frac{1}{5}$ (b) $\frac{4}{5} + \frac{2}{3}$ (c) $\frac{8}{9} - \frac{2}{3}$ (d) $\frac{4}{5} - \frac{3}{8}$

   (e) $2\frac{4}{5} + 3\frac{3}{4}$ (f) $1\frac{1}{7} + \frac{3}{5}$ (g) $5\frac{2}{3} - 3\frac{3}{5}$ (h) $5\frac{1}{3} - 2\frac{3}{4}$

4. Copy and complete :-

   (a) $\frac{4}{9} \times \frac{7}{8}$ (b) $\frac{2}{3} \times \frac{9}{16}$ (c) $2\frac{1}{3} \times 1\frac{1}{5}$ (d) $5\frac{5}{6} \times 1\frac{3}{7}$

   (e) $\frac{5}{6} \div \frac{2}{3}$ (f) $\frac{7}{9} \div \frac{2}{3}$ (g) $\frac{15}{7} \div \frac{5}{14}$ (h) $3\frac{5}{9} \div 2\frac{2}{3}$

5. A rectangle has length $4\frac{2}{3}$ metres and breadth $2\frac{1}{4}$ metres.
   Calculate the area of the rectangle.

6. A rectangle has an area of $8\frac{3}{4}$ metres.
   If the rectangle has length $5\frac{5}{6}$ metres, find the breadth.

Answers

Algebra – Distributive Law

1. a $7x$ b x c $8k$ d $10p$
   e $10g$ f $3t^2$ g $12p^2$ h $24k^3$

2. a $3x + 120$ b $6y - 18$
   c $18x + 36$ d $36b - 60$
   e $a^2 + a$ f $6k^2 - 12k$
   g $-12g - 6g^2$ h $-4w + 3w^2$

3. a $3x + 7$ b $8y + 5$
   c $6e$ d $1 + 8t$
   e $3x^2$ f $24y - 3y^2$
   g $8b + 3$ h $2a$
   i $a^2 + 5a$

4. a 3 b 10 c 21 d 12
   e 14 f -3 g 96 h 1

Equations

1. a $x = 14$ b $x = 50$ c $x = 6$ d $x = 8{\cdot}5$
   e $x = 0{\cdot}5$ f $x = 5$ g $x = 4$ h $x = 3{\cdot}5$
   i $x = -3$ j $x = 3$ k $x = 5$ l $x = 7$

2. a $7x = 2x + 25$ b 5

3. a $x = 7$ b $x = 8$ c $x = 6$ d $x = 4$
   e $x = 1$ f $x = 2$ g $x = 2{\cdot}5$ h $x = 3$

4. a $x = 18$ b $x = 5^1/_3$
   c $x = 8$ d $x = 9$

5. a $x > 3$ b $x \leq 24$ c $x \geq 32$
   d $x < 16$ e $x > 3$ f $x \leq 5$
   g $x \geq 29$ h $x < -2$ i $x \leq 8$

Statistics – Pie Charts

1. a Angles = 40° 60° 120° 140°
   b Drawing

2. a Angles = 120° 60° 72° 108° Drawing
   b Angles = 40° 60° 240° 20° Drawing

3. Angles = 80° 130° 50° 40° 60° Drawing

Probability

1. a No Chance 0 b Definite 1
   c 50/50 $^1/_2$ d Various

2. a $^1/_2$ b $^1/_5$ c $^2/_5$ d $^3/_{10}$

3. a $^3/_{40}$ b $^9/_{40}$ c $^3/_{10}$ d $^3/_8$
   e $^1/_{40}$ f $^7/_{10}$ g $^3/_5$ h 0

4. H T (or T H)

Fractions

1. a $3\frac{1}{7}$ b $27\frac{2}{3}$

2. a $\frac{17}{4}$ b $\frac{92}{9}$

3. a $\frac{3}{5}$ b $1\frac{7}{15}$ c $\frac{2}{9}$ d $\frac{17}{40}$
   e $6\frac{11}{20}$ f $1\frac{26}{35}$ g $2\frac{1}{15}$ h $2\frac{7}{12}$

4. a $\frac{7}{18}$ b $\frac{3}{8}$ c $2\frac{4}{5}$ d $8\frac{1}{3}$
   e $1\frac{1}{4}$ f $1\frac{1}{6}$ g 6 h $1\frac{1}{3}$

5. $10\frac{1}{2}$ m^2

6. $1\frac{1}{2}$ m