# Snappers

Snappers, part of the T5 materials, are short, whole-class interactive activities based around key areas of mathematics pitched at levels 4 and 5.

Snappers provide starter activities for lessons. They can be run directly through a computer or copied onto an OHT. Alternatively, in many cases, the idea can be quickly drawn onto a board. The teacher support material gives ideas for the use and development in the classroom of the OHTs provided.

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These teaching notes give learning objectives, suggested questions, and suggestions for development.

The T5 plan suggests a programme for the use of Snappers combined with the other resources, but this is only a suggestion and these activities can be used to enhance all mathematics teaching in Year 7, Year 8, Year 9 and beyond.

SNAPPER 1

## Hundreds and thousands (place value)

### Objectives

- Multiply and divide by 10, 100 and 1000
- Understand the impact of multiplying or dividing a number by 10, 100 and 1000

### Suggested questions

1 What will happen to the answer 4032 if we use:
   - 5.6 rather than 56
   - both 5.6 and 7.2
   - 560 (10 times bigger) and 7.2 (10 times smaller)?

   and so on…

2 What happens to the unit value of each digit in 4032 when you decide to make it 10 times bigger? 100 times smaller?

3 Is it really the decimal point or the digits moving?

### Suggestions for development

1 Link to problems with metric units.

2 Extend to factors other than 10, 100 and 1000. For example:
If $56 \times 72 = 4032$, what is $56 \times 36$?

3 Keep the final answer and explore relationships. For example:
If $56 \times 72 = 4032$, then $28 \times ? = 4032$

SNAPPER 2

## Sports results (place value)

### Objectives

- Order decimal numbers to at least two decimal places
- Add and subtract decimal numbers with at least two decimal places
- Multiply and divide by 10, 100 and 1000; convert between metric units of length

### Suggested questions

1 Can you complete the sports results?

   Javelin:
   - Which digit do you look at first?
   - If that's the same, what next?
   - Why is it tempting to say B won?

   Long jump and pole vaulting:
   - Why is it difficult to compare 5.90 m and 5.095 m?
   - Which unit shall we agree on?

2 What is the total distance thrown by all five javelin competitors?

3 By how much did the javelin thrower win?

### Suggestions for development

1 Ask further conversion questions.

2 Practise rounding. Use number lines to decide how to round sports results to 1 d.p., to the nearest whole number … For example:
If all results were rounded to the nearest whole number, which results would look the same?
What if you rounded to 1 d.p.?

3 Consolidate written methods of addition and subtraction using questions as above.

SNAPPER 3

## Stepping stones to percentages (percentages)

### Objective

- Calculate percentages of a quantity

### Suggested questions

Choose the starting amount, for example £360.

1 Encourage memorising and rapid recall:
What is 5% of this? 10%? 20%? 25%? $33\frac{1}{3}$%? 50%?

2 Use to derive other facts:

– halving and doubling:
If 10% is £36, what is 20%? 40%? 60%?
If 25% is £90, what is $12\frac{1}{2}$%?

– adding or subtracting from one whole:
If 1% is £3.60, what is 99%? 101%?

3 Which stepping stone might I start at if I want to find:
$12\frac{1}{2}$%? $2\frac{1}{2}$%? 45%?

### Suggestions for development

1 Use one set of stepping stones to work out awkward percentages:

$17\frac{1}{2}\%$ of £360 $= (10 + 5 + 2\frac{1}{2})\%$ of £360
$= £36 + £18 + £9$
$= £63$

Then use it to solve simple word problems.

2 Consolidate by using other starting amounts.

SNAPPER 4

## Stepping stones to fractions (fractions)

### Objective

- Calculate fractions of a quantity

### Suggested questions

Choose the starting amount, for example £60 or £240.

1 Encourage memorising and rapid recall:
What is $\frac{1}{2}$ of this? $\frac{1}{3}$? $\frac{1}{4}$? $\frac{1}{5}$? $\frac{1}{10}$? $\frac{1}{100}$?

2 Use to derive other facts:

– halving and doubling:
If $\frac{1}{10}$ = £24, what is $\frac{2}{10}$ or $\frac{1}{5}$? $\frac{3}{10}$? $\frac{1}{20}$?

– adding or subtracting from one whole:
If $\frac{1}{10}$ = £24, what is $1\frac{1}{10}$? $\frac{9}{10}$?

3 Which stepping stone might I start at if I want to find: $\frac{3}{8}$? $1\frac{1}{4}$? $\frac{1}{6}$?

### Suggestions for development

1 Use one set of stepping stones to work out awkward fractions:

$\frac{17}{20}$: find $\frac{1}{10} \rightarrow \frac{1}{20} \rightarrow \frac{17}{20}$

Then use it to solve simple word problems.

2 Consolidate with other starting amounts.

SNAPPER 5

## Year 9 maths (ratio)

### Objectives

- Understand the idea of ratio and use ratio notation
- Simplify a ratio to an equivalent ratio by cancelling

### Suggested questions

Check for understanding and accurate use of language for ratio. For example:

1. How many girls and boys are there altogether in 9B?
2. What is the ratio of girls to boys in the whole class? How do you write this? What is the ratio in its simplest form?
3. What is the ratio of boys to girls? How do you write this? What is the ratio in its simplest form?

### Suggestions for development

1. Use the resource sheet and extend the table to 9F and 9G (the teacher or pupils could choose ratios).
2. What if each Year 8 class has 36 pupils? Work out a similar table for 8A to 8G.
3. Extend the activity to more demanding ratios.

SNAPPER 6

## Arrows (sequences)

### Objectives

- Find terms in a sequence from its position and vice versa
- Find the rule for sequences derived from practical contexts

### Suggested questions

1. Look for spatial and number patterns.
   - Which part of the arrow is being added each time?
   - Does this fit in with the number pattern?
   - How is each term changing each time? (increasing by 4)
     What does this tell you about the rule? (includes $\times 4$)
     Where does the +2 come from? (in first arrow)
2. Use the rule to find *a* from *m* and vice versa.
   - How many matches are needed for 10 arrows?
   - How many arrows can be made with 102 matches?

### Suggestions for development

Generate other sequences from practical contexts and explore the rules.

SNAPPER 7

# Twelve days of Christmas (expressions and equations)

## Objectives

- Represent words with symbols and vice versa (focus of activity)
- Form and solve simple equations
- Collect like terms
- Substitute values in an expression or equation

## Suggested questions

1 Use the first OHT to connect algebraic with arithmetic rules:
If 2 less than 6 is 6 – 2, then what is 2 less than *n*?

2 Use OHT 1 to address common exam errors:
Which expressions are most easily confused?

$n^2$, $2n$, $\frac{n}{2}$, $n + 2$, $n - 2$

$2n + 6$ and $2(n + 6)$

$n - 2$ and $2 - n$

3 Use OHT 1 to practise collecting like terms, for example:
How many presents in total were there on the 3rd and 7th days?

4 Use OHT 2 to practise substitution, for example:
If $x = 10$, how many presents did I get each day?

5 Use OHT 2 to clarify the meaning of $x^2$:
On the 9th day, I got twice the square of the number on the 1st day.
Which step comes first: multiplying by 2 or the squaring?
How would you write this?
Explain how you would say $(2x)^2$.
Explain how it differs from $2x^2$.

6 Use both OHTs to form and solve equations, for example:
I get 16 presents on the 7th day.
What is *n*?
I get 42 presents on the 7th day.
What is *x*?

## Suggestions for development

1 Using the resource sheets:

- Find expressions for the number of presents for all twelve days (there are two possible answers for the 8th day – explain why they are equal).
- Practise forming expressions: match each word and algebraic expression.
- Practise substitution:
If $n = 4$, how many presents did I get each day?
If $x = 10$, how many presents did I get each day?

2 Design your own puzzle for the twelve days of Christmas, choosing a value for *n* or *x* first (the number of presents on the 1st day). Exchange puzzles with your partner and see if you can work out each expression, and find the number of presents on the 1st day.

SNAPPER 8

## Substitution spider (substitution)

### Objective

- Substitute values in an expression

### Suggested questions

1. Choose a positive integer for the starting number:
   What is $2n$ if $n = 4$? So what is $2n + 1$?
2. Choose a negative integer:
   What is $3 - n$ if $n = {}^{-}4$?
3. Choose a fraction:
   What is $3n$ if $n = \frac{1}{2}$? If $n = \frac{1}{4}$?

### Suggestions for development

1. Extend the expressions on OHT 2 onto an A3 sheet, so that pupils (working in pairs) can explore a wider variety of expressions.
2. I have $3(n + 1) - 2$. Where might I have started from?
3. Choose one starting expression and ask pupils to work out the most challenging expression for the teacher to work out – pupils still have to check that it's right!

SNAPPER 9

## Halving rectangles (area and perimeter)

### Objective

- Calculate the areas and perimeters of rectangles (and triangles)

### Suggested questions

1. In addition to those on the OHT:
   - What do the 6 cm by 4 cm and the 12 cm by 2 cm rectangles have in common? (area)
     What is different? (perimeter).
   - Why does $4 \times 6$ give the correct area? (link to four rows of six 1 cm squares)
   - Which is halved when the rectangle is cut in half: its area or its perimeter? Why?
2. What if you halve the starting shape four times?
   How would you do it to get the rectangle with the biggest perimeter?
   And the biggest area?
3. What if the shape needn't be a rectangle? (e.g. triangles)

### Suggestions for development

1. Use the halving rule to find areas of triangles, using the link to understand that $A = \frac{1}{2} b \times h$ is derived from $A = l \times w$ for the original rectangle.
2. Extend to area calculations for compound shapes (made from rectangles).
3. Extend to area calculations for parallelograms.

SNAPPER 10

## Nets of cuboids (nets and solids)

### Objective

- Use 2-D representations of 3-D shapes

### Suggested questions

1. How many faces are missing?
2. Visualise how to fold up this net. If this face (indicate) is the base, which is the front, left, right, …?
3. In how many different places might the 5th face go? Draw one of the nets.
4. If the 5th face goes here (indicate), where might the 6th face go? Draw a net.
5. When the net is folded up, which corner does this corner meet?

### Suggestions for development

1. Explore other cuboids; extend to cubes, triangular prisms and pyramids. Include 2-D to 3-D and 3-D to 2-D.
2. Calculate volumes.
3. Consider other 2-D representations: plans and elevations; isometric drawings.

SNAPPER 11

## Angles and transformations (angles and symmetry)

### Objectives

- Recognise and visualise translations, reflections and rotations
- Deduce angles from symmetry properties

### Suggested questions

1. How many lines of symmetry does this shape have? What is its order of rotation symmetry?
2. What angles do you know? How did you work them out?

### Suggestions for development

Consider a wider range of angle problems involving symmetry properties.

SNAPPER 12

## Transformations (transformations)

### Objectives

- Reflect and rotate 2-D shapes
- Recognise and visualise translations, reflections and rotations

### Suggested questions

1. Draw (if possible, on squared mini-whiteboards) what happens to shape A if you:
   - reflect it in the *y*-axis …
     in the *x*-axis …
     in line RS (tip: turn the grid so that RS is horizontal or vertical)
   - translate it 3 to the right and 4 down …
   - rotate it 90° anticlockwise about O …
   - enlarge it so that it is twice as big (no centre).
2. What did I do to shape A to get B (draw)?
3. What are the coordinates of point M? Which transformation will move this point to (1, ⁻3)?

### Suggestions for development

1. Consider simple combined translations, for example:
   Which single translation replaces these two translations? …
2. Coordinates:
   What are the coordinates of the four vertices of A?
   What happens to point M after the following transformations? …
3. Enlargements: enlarge the shape by scale factors of 2, 3, 4, …

SNAPPER 13

## Potato bar chart (interpreting data)

### Objective

- Interpret and draw inferences from a bar chart

### Suggested questions

1. What was the most popular type of potato?
2. How many preferred chips ? … baked potatoes? … mashed? … none?
3. How many teachers were asked altogether?
4. What fraction preferred each type of potato?

### Suggestions for development

1. Compare two or more sets of data tables, graphs and diagrams.
2. Link with the comparison of data using statistics.

SNAPPER 14

# Potato pie chart (pie charts)

## Objective

- Interpret and draw inferences from a pie chart

## Suggested questions

1 What was the most popular type of potato for teachers at school B?

2 If there were 40 teachers in the survey:
   – estimate how many preferred baked potatoes.
   – estimate how many preferred chips.

3 Estimate what percentage of teachers preferred chips.

4 What can you say about the number of teachers who preferred mashed and baked potatoes?

5 If 8 teachers chose mashed potato, how many teachers chose baked potatoes, chips, none? How many teachers altogether were surveyed?

6 Using Snappers 13 and 14:
Which fraction is the same for both schools?
What are the main differences between teachers' preferences at schools A and B?

7 Do you think that a survey showing the types of potatoes preferred by pupils would be different to one on teachers' preferences?

## Suggestions for development

1 Compare two or more sets of data tables, graphs and diagrams.

2 Link with the comparison of data using statistics.

3 Use Snappers 13 and 14 to explore the main advantages and disadvantages of pie charts versus bar charts. Hence explain the differences in their uses.

SNAPPER 15

# Fairground games (probability)

## Objectives

- Find probabilities based on equally likely outcomes in simple contexts
- Know that if the probability of an event is *p*, then the probability of it not occurring is (1 – *p*)

## Suggested questions

1 Hex-a-Spin
   – What is the probability of winning £5? … of winning more than £1?

2 Oct-a-Spin
   – Complete the spinner so that the probability of winning less than £5 is $\frac{1}{2}$ and less than £2 is $\frac{1}{4}$. (You can use any of £1, £2, £5, £10.)
   Is there more than one solution?
   (All solutions have
   1, 1, 2, 2, …, …, …, …)
   – What if the probability of getting £5 is 25% and getting more than £2 is $\frac{3}{4}$? (All solutions have
   5, 5, 10, 10, 10, 10, … , …)

## Suggestions for development

1 Design games to meet a range of criteria, as with Oct-a-Spin.

2 Use other contexts, such as dice, cards, coloured counters, names in a hat, …

SNAPPER 16

# Mean maths (averages)

## Objective

- Find the mean, median, mode and range of a list of numbers

## Suggested questions

1 Highlight correct language use, for example:
mean (not 'mean average')
range (e.g. 4, not 6 – 2).

2 What's the lowest mean you can find of any three results? And the range? What's the highest mean of any three results? And the range?

3 (Using the three boxes) Mr Cullen notices the following statistics. Can you work out what the three numbers are?

- Three numbers have a mean of 8 (6, 9, 9).
- Three numbers have a mean of 4 (1, 5, 6).
- Three numbers have a median of 6 and range of 8 (1, 6, 9).
- Three numbers have a median of 6 and a range of 4 (5, 6, 9).
- Three numbers have a mode of 9 and a range of 8 (1, 9, 9).
- Three numbers have a median of 6 (1, 6, 9 or 5, 6, 9).

## Suggestions for development

1 Use Mean maths 2 to explore other number lists.

2 Find the mean, mode, median and range in other contexts.

3 Compare two sets of data using one average and the range.