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Sample lessonSample lessons using ICT

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Department for Education

The National
Numeracy *Strategy*

Practice

Curriculum & Standards

Sample lessons using ICT

Headteachers and Teachers of all primary age pupils

Status: Recommended
Date of issue: 11/00
Ref: DfEE 0262/2000

Raising Standards
Standards and Effectiveness unit

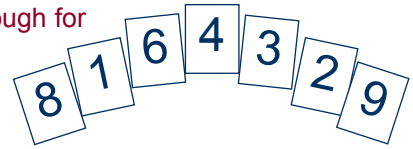
DfEE
Department for Education and Employment

Excellence in schools

Using 'Counter' to count on and back to 10

Resources

'Counter', computer, set of objects to be counted, large digit cards, number fans, number cards 1–9 (enough for one per child)



Vocabulary

number, numbers, one, two, three, four, five, six, seven, eight, nine, ten, count, count on, count, back, next, before, after

about 10 mins

Starter: whole class

Hold up large digit cards and get the class to name the digit.

> This card says five, what does this one say?
> This card says three; if we were counting on, what number would come next?
> Who can show me the right card to hold up?

Give each child a number card. Ask children with the number 6 to stand up and show their card. Repeat several times, choosing different numbers. Choose children to come out and place their cards in order, 1–9. The other children should say the number as it is placed.

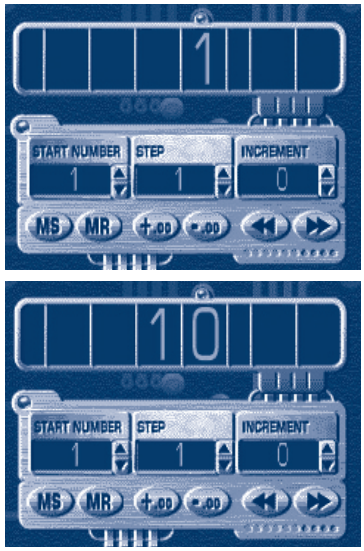
Hold up a number of objects, and choose a child to point to the correct number on the large cards.

about 25 mins

Main activity: whole class

Load the 'Counter' program and set up one counter with start number 1, step 1. Press MS to store your settings. Explain that today the class is going to use the computer to help them with their counting on and back. Press Play to start the counter. When the display reaches 10, press Stop. Ask the children to explain what has happened on the counter.

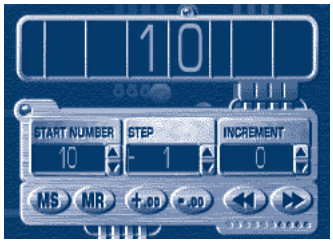
Press MR to restore your settings. Press the Step button to count. Ask the children to hold up the right number of fingers to match the number on the screen. When the display reaches 10, press Stop. Repeat a second time if necessary.



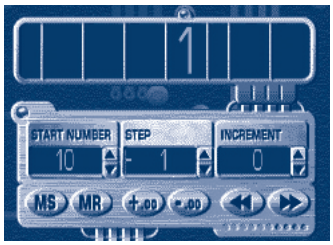
Objectives

- Recite the number names in order, continuing the count forwards and backwards from a given number.
- Recognise and use numerals 1 to 9.

Set up one counter with start number 10, step –1. Press MS to store your settings. Press Play to start the counter. When the display reaches 1, press Stop. Ask the children to explain what has happened on the counter.



Press MR to restore your settings. Press the Step button to count. Ask the children to hold up the right number of fingers to match the number on the screen. When the display reaches 1, press Stop. Repeat a second time if necessary.



Set up one counter with start number 6, step 1. Press MS to store your settings. Ask the children to predict what number will come next on the counter if they count on. Press Step to check their answer. Continue until you reach 10, then press Stop.
Set up one counter with start number 6, step –1. Ask the children to predict what number will come next on the counter if they count back. Press the Step button to check their answer. Continue until the display reaches 1, then press Stop. Repeat a second time if necessary.

about 10 mins

Plenary

Conclude the lesson by organising the children to sit in a circle. Chant together, counting quickly in twos from 0.

Two, four, six, eight ...
Now count quickly in twos from 1. One, three, five, seven, nine, eleven ...
Count back in twos from 20.
What number is two less than 18?
What number is two more than 12?

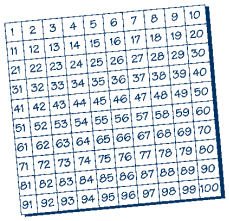
Now start from 5 and count on in twos. Finally, remind the children what they have learned in the lesson about counting on and back in different steps.

Year 3

Using 'Counter' to count in 2s, 5s and 10s up to 100

Resources

'Counter', computer, individual 1–100 squares, 100 square peg board with different coloured pegs



Vocabulary

multiple
multiples
number grid
pattern
sequence

about 10 mins

Starter: whole class

Ask the children to chant in 2s up to 100, in 5s up to 100 and in 10s up to 100. Use a 1–100 number line. Select a start number, then choose a child to come and show the next three numbers in the sequence if counting in 2s, 5s or 10s.

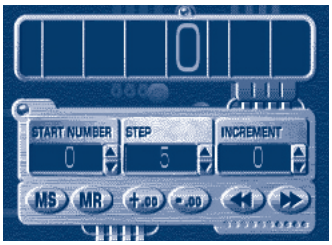
Write some number series on the board, such as 54, 56, 58, 60 ... or 35, 40, 45, 50 ... Ask the children to describe each pattern and to give the next number(s) in the sequence.

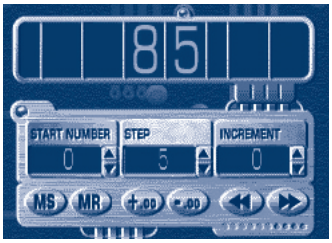
Write some other sequences, such as 60, __, __, 90, 100 or 25, 30, __, __, 45, __, 55, and ask the children to fill in the missing numbers.

about 30 mins

Main activity: whole class

Load 'Counter' and set up one counter with start number 0, step 5. Press MS to store your settings. Explain that the class is going to use the computer to help them with number sequences of 2s, 5s and 10s, and press Play to start the counter. When the display reaches 85, press Stop. Ask the children to describe the sequence of numbers they have just seen and to predict what the next number will be. Press the Step button to check their answer. Repeat this two or three more times to make sure that all the children understand what is being displayed.





Repeat, using steps of 2 and 10, and starting from 0.

Ask the children if they can explain what a multiple is. Make sure that the children understand that multiples can be divided exactly by a number. For example, 25, 30 and 35 are multiples of 5 because they can be divided exactly by 5.

Objective

- Recognise two-digit and three-digit multiples of 2, 5 or 10.

Main activity: group with computer

Set up one counter with start number 0, step 5. Press MS to store your settings. Ask the children to count how many numbers are displayed on the screen before the counter is stopped at 100. Encourage the children to explain that there are 20 multiples of 5 from 0 to 100.

Ask questions like:

> What is the next multiple of 5 that we will see on the screen?
> Tell me what multiples of 5 we will see between 100 and 120.
> Write down all the multiples of 5 between 0 and 50.
> What do you notice about these numbers? (*Hint*: look at the last digit of each number.)

Press Step on the computer to check their answers.

Show the children how to set the counter. Ask them to set up and run the counter to find how many multiples of 2 there are between 0 and 50, and to record the answer in their notebooks.

Record all the multiples of 2 between 0 and 30, and ask the children to predict 3 multiples of 2 between 100 and 110. Check their answers using 'Counter'.

Ask the children to set up and run the counter and count how many multiples of 10 there are between 0 and 100. Tell the children to write the answer in their notebooks and explain how they will be able to tell whether or not a number is a multiple of 10.

Other group activities

Other groups can use a 100 square and mark on it – in different colours – all the multiples of 2, 5 and 10, or use a 100 square peg board and put in different coloured pegs for the multiples of 2, 5 and 10. Devise a strategy for coping with numbers such as 20, which are multiples of all three. Another possibility is to use multiplication tables to record the multiples of 2, 5 and 10.

about 10 mins

Plenary

Conclude the lesson by organising the children to sit in a circle. Chant together, counting quickly in twos from 0.

> Two, four, six, eight ...
> Now count quickly in twos from 1. One, three, five, seven, nine, eleven ...
> Count back in twos from 99.
> What number is two less than 81?
> What number is two more than 69?
> Now start from 15 and count on in fives.
> Start from 17 and count on in tens.

Finally, remind the children what they have learned in the lesson about counting on and back in different steps.

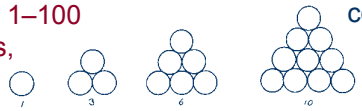
Year 6

Using 'Counter' with two counters to show the sequence of triangular numbers

Resources

Resources

'Counter', computer, individual 1–100 squares, matchsticks, counters, cubes or straws



Vocabulary

consecutive, pattern, sequence, relationship, rule, continue, predict, triangular

about 10 mins

Starter: whole class

Revise number sequences by asking children to provide the next three numbers in sequences such as 38, 47, 56, 65 or 135, 137, 139, 141. Ask the children to explain the rule. Write on the board a sequence with missing numbers, such as __, __, 45, 49, __, 57, 61, __. Ask the children to fill in the gaps.

Draw this table on the board.

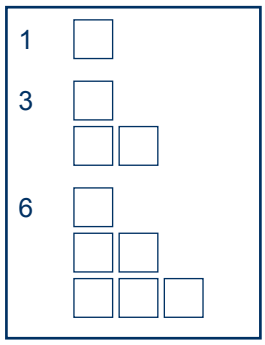
twos	fours	eights
2	4	8
4	8	16
6	12	24
8	16	32

Ask the children to explain what they notice about the sequences when they count from zero in 2s, 4s and 8s.

about 35 mins

Main activity: whole class

Tell the class they are going to do some further work on number patterns and sequences, and demonstrate a sequence by drawing these arrangements of matchsticks on the board.



Ask individual children to come and draw the fourth, fifth and sixth arrangements, and to tell you how many squares are in each arrangement. Record this at the side of each one. Tell or remind the children that these number are called 'triangular numbers' because the pattern that is made forms the shape of a triangle. Remind children of the 'Counter' program and ask whether they think it would be possible to demonstrate this sequence using the program.

Load 'Counter' and set up two counters. The first starts at 1, and goes up in steps of 1. Press MS to store your settings. The second should have a start number of 1, a step of 2 and an increment of 1. Press MS to store your settings. Press Play to start the counter. When the display on Counter 2 reaches 21, press Stop. Ask the children to describe the sequence of numbers they have just seen, and to predict the next number. Press the Step button to check their answer. Repeat this two or three more times to ensure that all the children understand what is being displayed.

Objective

- Recognise and extend number sequences such as the sequence of square numbers or the sequence of triangular numbers.

Tell the children that the first counter is indicating which arrangement in the sequence is being considered – the first, second, third and so on – while the second shows the triangular number value of that arrangement. Ask the children to describe how they arrived at their answer of what the next number in the sequence will be.

Press MR to go back to your original 'Counter' settings. This time, make a chart on the board to show the sequence building up.

Arrangement of the sequence	Number displayed	How the sequence is developed
1	1	1
2	3	1+2
3	6	1+2+3
4	10	1+2+3+4
5	15	1+2+3+4+5
6	21	1+2+3+4+5+6
7	28	1+2+3+4+5+6+7
8	36	1+2+3+4+5+6+7+8
9	45	1+2+3+4+5+6+7+8+9
10	55	1+2+3+4+5+6+7+8+9+10

Main activity: group with computer

Press MR to restore your original settings. Run the counters up to the tenth arrangement and press Stop. Remind the children of how the sequence is built up, as shown in the table. Ask questions such as the following:

What is happening to the number each time the arrangement is increased? Tell me how it is getting bigger.

Can you spot a rule to explain how this is happening?

What will the fifteenth number be? ... and the twentieth?

How would you work out what the hundredth number is?

Other group activities

Other groups can use a 100 square to colour in the first 10 sequences of the triangular number pattern, and use matchsticks, cubes, straws or counters to build the pattern to its fifteenth arrangement.

about 10 mins

Plenary

Conclude the lesson by working through what each group tackled during the main activity. Use 'Counter', and ask one of the group who had worked on determining the rule for this sequence to explain how the pattern develops. Finally, remind the children what they have learned in the lesson about triangular numbers.

Year 1

Using 'Play Train' to partition numbers using 1 to 5

Resources

'Play Train', computer, set of counting objects, large digit cards, playing cards, total cards, six-sided dice

Vocabulary

how many?
how many are left?
how many more?
total, equals, altogether

about 10 mins

Starter: whole class

Ask the whole class to respond rapidly to oral questions such as:

6 plus 3, 4 add 3, add 2 to 4.
How many are 3 and 5 together?
What is the total of 2 and 8?
Which two or three numbers could make 9 altogether?
What must I add to 4 to make 10?

Ask the children to add up mentally three small numbers, within the range of 1 to about 12, then to respond to oral questions, explaining the strategy used. For example, find the sum or total of 3 + 2 + 3, 2 + 1 + 2, 3 + 5 + 3. Seek rapid responses to oral questions such as:

I roll double three on two dice, what is my score?
I roll double 4?
I roll two fives?

about 25 mins

Main activity: whole class

Tell the children that they will be looking at making totals of numbers using numbers 1 to 5. They might also need to use doubles of these numbers. Ask the children to select two numbers from the set 1 to 5. Add them up. What different totals can you make?

Record the different solutions on the board. Ask the children to tell you three numbers that add up to 11. Write the first solution on the board. Ask if they can make any others and record their answers.

Give out large number cards using the numbers 1 to 5. Hold up a card and ask whoever is holding the card that will make the total 7 to stand up and show it; if you hold up a 2, the child holding the number 5 card stands up and shows it. Now ask the child who is holding the card that will make the total 11 to stand up and show his or her card. (The child holding 4 stands up.) Repeat this several times with different totals.

Explain that today the class is going to use the computer to help them with their addition facts using the numbers 1 to 5. Tell the children that the train has a number of carriages into which passengers must be placed. The total number of passengers can only be made up using the two numbers given by the computer.

Objectives

- Know by heart the pairs of numbers with a total of 10.
- Know addition facts for all pairs of numbers with a total to at least 5 and corresponding subtraction facts.
- Know addition doubles of all numbers to at least 5.

Load the 'Play Train' program and set it to level 1 (Easy). Choose an example that is not too difficult for your children; press 'New Game' if the example that appears needs to be changed. Look at the total number of carriages and passengers shown on the platform, and explain that the children must make this total using the two numbers shown in the yellow display box. The task may be to fill the train's five carriages with 14 passengers using the numbers 2 and 3: ask the children to suggest possible solutions, such as: 3 + 3 + 3 + 3 + 2 or 3 + 3 + 2 + 3 + 3, and show them how to enter the solution by clicking on the number buttons on the yellow display. If they are right, the train moves off. Repeat this several times.

Main activity: group with computer

Set up the program on one or two computers for 6–8 children. Tell the group that they are going to use the program to fill several trains with people. The totals and numbers they can use will change each time they choose 'New Game'. Explain that if the total is too small or too big then a message will appear on the gantry. Split the group into pairs or threes to play. Ask the children to record their possible solutions by laying out number cards, then to choose one and take it in turns to enter it into the program.

Other group activities

Make it game This game needs a set of playing cards with the picture cards removed and a set of target totals, such as 12, 10, 9 or 8. Each child chooses a target total card from a pile placed face down, then uses the playing cards to make their target total. They score 1 point for making the total using two cards and 2 points for making it with three.

Make 10 game Children throw a six-sided dice. Whatever number they throw, they have to say what they need to make that number up to 10. For example, they throw a 5. To score 1 point, they say that 5 will make it up to 10. To score 2 points they say that 3 and 2 will make it up to 10. Keep a record of how many points each child scores.

about 10 mins

Plenary

Ask the children to explain what they have learned about addition facts in the lesson. One group might explain that they found it does not make any difference which order they do their addition, the total stays the same. Another group might explain that they can make their totals using two or three numbers by breaking the number into smaller parts.

Write the number 12 on the board. Ask the children to tell you three numbers you can add together to total 12. Record their suggestions. Write four numbers on the board, such as 4, 5, 6, 9. Ask the children to choose three of them and add them up. Record the totals. What is the biggest number they can make? What is the smallest?

Finally, remind the children what they have learned in the lesson about addition facts.

Year 6

Using 'Play Train' to partition numbers using multiples of the numbers 1 to 9

Resources

'Play Train', computer, 12 x 12 multiplication grids, a set of target total cards, 18 cards featuring the numbers 1–12, Activity Sheet 5 – Dartboard, made into OHT

Vocabulary

doubles, halves, twice, multiplied, shared between

about 10 mins

Starter: whole class

Ask the children to respond rapidly to oral questions such as:

Nine eights?
How many sevens in 56?
Eight times eight?
Seven multiplied by seven?
Multiply 11 by 8?
What are the factors of 72, 24, 36, 18 ...?
What is 48 shared between 8? Double 19? Half of 38? Twice 17?
What is 4 x 3 and 5 x 7?

Now ask them to respond to oral questions, explaining the strategy they used, for example:

Share 108 between 9?
Divide 112 by 7?
Divide 15 into 225?
How many groups of 16 can be made from 100?
Is 156 divisible by 8? How do you know?

Write these number sentences on the board and ask the children to fill in the blanks: 36 ÷ 4 = __ ; 72 ÷ __ = 6; __ ÷ 9 = 8.

about 30 mins

Main activity: whole class

Tell the children that they will be looking at making totals of numbers using the numbers 1 to 9. They might also need to use doubles of these numbers and their knowledge of factors and multiplication and division facts.

Ask the children to use three numbers from the set 1 to 9 and multiply them together. Ask the children questions such as:

What different totals can you make?
What is the biggest number you can make?

Record different solutions on the board. For example: 3 x 9 x 6; 7 x 5 x 3.
What is the largest number they can make if they only use each number once?

Write a target number on the board, such as 46. Ask the children to work out how to reach this total by using multiples of the numbers 7, 6 and 2 and the operations of multiplication and addition only. Take suggestions from the children. One solution is: 7 x 2 = 14, 6 x 5 = 30 and 2 x 1 = 2 then 14 + 30 + 2 = 46. Work through several similar examples, such as 34 with 2, 8 and 4; 45 with 9, 2 and 3; 60 with 5, 2 and 8; and 76 with 9, 6 and 7.

Explain that the class is going to use the computer to help them with their multiplication and division facts using the numbers 1 to 9. Load the 'Play Train' program and set it to level 3 (Hard). Choose an example for your children. Press 'New Game' if the example which appears needs to be changed. Look at the total number of carriages and passengers shown on the platform and explain that this is the total the children must make using only the three numbers shown in the yellow display box. For example, fill the train's 11 carriages with 37 passengers using the

Objectives

- Consolidate knowing by heart multiplication facts up to 10 3 10.
- Understand the operation of multiplication and the associated vocabulary and its relationship to addition and division.
- Understand the operation of division and the associated vocabulary and its relationship to subtraction and multiplication.
- Use factors (e.g. 35 x 18 = 35 x 6 3).
- Partition (e.g. 87 x 6 = (80 x 6) + (7 x 6).
- Solve mathematical problems or puzzles, recognise and explain patterns and relationships.

numbers 8, 7 and 1. The total of passengers can only be made up using the three numbers given by the computer, and there must be no empty carriages. Ask the children to suggest possible solutions, such as (8 x 2) + (7 x 2) + (1 x 7). Show the children how to enter the solution by clicking on the number buttons on the yellow display. If the total is correct the train moves off. Repeat this several times.

Main activity: group with computer

Set up 'Play Train' on one or two computers for 6–8 children. Explain that the children are going to use the program to fill several trains with people. The totals and numbers they can use will vary each time they choose 'New Game'. Tell the children that if the total is too small or too big then a message will appear on the gantry. Split the group into pairs or threes to play, and ask them to record their possible solutions in their exercise books. They should choose one possible solution and take it in turns to enter it into the program.

Other group activities

Cover it up game Children use a 12 x 12 multiplication square. A set of target total cards (for example 225, 98, 78, 172) is placed in a pile. Each child takes it in turn to choose one target total card from this pile and then uses the multiplication square to make their target total by adding three different numbers from the square. If the target is 115, they could choose 4 x 5 = 20, 5 x 3 = 15 and 8 x 10 = 80. They should place their counters on 20, 15 and 80. In order to win the game a player must cover four numbers in a vertical, horizontal or diagonal line on the square.

Largest product game Eighteen cards featuring the numbers 1–12 are placed face down in three rows of six. The children take it in turns to turn over any six cards. Using their knowledge of multiplication facts, they then work out the largest possible product by combining the six numbers into three pairs, multiplying each pair, then summing the results. For totals below 50 score, they score 1 point; between 51 and 64, 2 points; between 65 and 80, 3 points; between 81 and 100, 4 points; and over 100, 5 points.

	7			2	
6			3		
		3			8

In the example above, the six numbers could be combined, for example, as 6 x 7 = 42, 3 x 8 = 24 and 4 x 2 = 8, for a total of 74 and three points; or as 8 x 7 = 56, 4 x 6 = 24 and 3 x 2 = 6, for a product total of 86 and four points.

about 15 mins

Plenary

Conclude by getting the children to explain what they have learned about multiplication and division facts in the lesson. One group might explain that they found it does not make any difference which order they do their multiplication, the total stays the same. Another group might explain that they can make different products by carefully selecting which of their numbers they multiply and add.

Show the OHT of a dartboard (made from Activity Sheet 5). Set the children a target number to reach using just three darts. They can use doubles and trebles, but not the bull's-eye or inner ring to make their total. For example, a target of 72 can be achieved by throwing double 17, treble 6 and a single 20. Repeat several times with new targets. Finally, remind the children what they have learned in the lesson about multiplication and division facts.

Year 2

Using 'Minimax' to explore place value

Resources

'Minimax', computer, place value cards, large digit cards, number cards 1–9, Activity Sheet 6.1 – Step up, Activity Sheet 6.2 – Step down

Vocabulary

units, ones, tens, hundreds, digit, one-digit number, two-digit number, three-digit number, place value, zero, largest, smallest, add, subtract

about 10 mins

Starter: whole class

Chant the number names forwards and backwards, counting in ones from 0 to 20, in 10s from 0 to 100 and in 100s from 0 to 1000. Ask the children questions such as:

> What number comes before 17? ... after thirty? ... before 97?

Hold up large digit cards and asks questions such as:

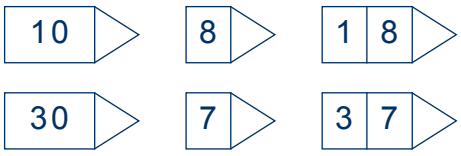
> What does the 2 in 24 represent? What does the 4 represent?
> What does the 6 in 64 represent? What does the 4 represent?
> What does the 9 in 97 stand for? What does the 7 stand for?
> Which number is the same as one ten and eight ones? ... six tens and four ones? ... eight tens and no ones?

Write these numbers on the board: 50, 32, 94, 19, 28, 6. Ask the children to put them in order, with the smallest first. Now write these numbers: 27, 34, 16, 7, 98, 100. Ask the children to put them in order, with the largest first.

about 25 mins

Main activity: whole class

Show children a series of two-digit numbers using place value cards, such as 10, 8, 30, 7.



Ask the children questions such as:

> What does the digit 8 stand for? ... and the 1?
> What does the 3 stand for? … and the 7?

Tell the children that they will be using their knowledge of place value to make the largest or smallest number possible. In the program 'Minimax', the computer gives you a number and you have to decide the best place to put that number in order to make the largest or the smallest total. Load 'Minimax' and choose Operator set to Addition, Number Size set to T U, and Target set to whether you want the minimum or maximum number. Press 'New Game'. The computer will present a digit for you to place in the sum.

Objectives

- Know what each digit in a two-digit number represents, including 0 as a place holder.
- Use known number facts and place value to add and subtract mentally.

Ask the children where they think would be the best place to put the first digit. For example, if a 9 is displayed and the sum is TU + U, to make the largest possible number 9 should be put in the Tens place because they will not get a higher number. If a 3 is displayed, they are likely to get a larger number and so they should place the 3 in one of the Units places. Once each place is filled, the children work out the answer and enter it in the computer. If they are right they will get a 'Well Done' message; if not, they will be encouraged to try again. You may need to explain the zero as a place holder if it comes up, and explain what it means as a 'leading' zero if the only place it can be put is in the Tens column. Look once more at the digits presented. Ask the children whether they could have made a larger/smaller number using these digits.

Main activity: group with computer

Set up the program on one or two computers for 6–8 children. Explain to the children that they are going to use the program once more to try and make the largest or smallest totals possible. Tell the children to pay particular attention to the digits as they are given and to think carefully about whether they are likely to get a larger or smaller number given to them. Ask the children to record the sums they have made and their answers.

Other possible activities

Little or large number game Children take it in turns to pick up a card from each of two piles containing the digits 1 to 9. The object of the game is to use the two digits to make the largest and smallest numbers possible. They record their numbers on paper.

Step-up worksheet Children use Activity Sheet 6.1 to work out the number they require to step the first given number up to the second number. For example, in one step the children make 3 up to 33 by adding 30.

Step-down worksheet Children use Activity Sheet 6.2 to work out the number they need to step the first given number down to make the second number. For example, in one step the children make 42 into 2 by subtracting 40.

about 10 mins

Plenary

Ask the children to explain what they have learned about place value. One group might explain that they found the highest numbers could be made by selecting the bigger digits to go in the Tens column and the smaller ones to go in the Units column. The opposite applied if they wanted to make the smallest number. Another group might explain that they had to pay attention to what digit was in the Tens column to help them decide how much to 'Step up' or 'Step down'.

To finish the lesson, write on the board questions such as Which is more, 36 or 63? Which is less, 67 or 76? Which is more, 12p or 21p? Which is more, 31 metres or 13 metres? Finally, remind the children what they have learned in the lesson about place value.

Year 4

Using 'Minimax' to explore place value

Resources

'Minimax', computer, place value cards, large digit cards, individual digit cards, set of flash cards with numbers written in words,
Activity Sheets 7.1 and 7.2 – Cross number puzzle 1,
Activity Sheets 7.3 and 7.4 – Cross number puzzle 2

Vocabulary

units, ones, tens, hundreds, thousands, digit, one-digit number, two-digit number, three-digit number, four-digit, numeral place value, zero, largest, smallest, add, subtract

about 10 mins

Starter: whole class

Chant the number names forwards and backwards, counting in 100s from 0 to 1000 and thousands from 0 to 9000. Hold up large digit cards with numbers such as these: 765, 1289, 3603, 5002. Ask the children to read out their value, for example, seven hundred and sixty-five.

What does the 8 stand for in 1289? What does the 9 stand for?

Display a set of flash cards on the board with numbers in words, such as two thousand three hundred and seventy or four thousand and seven.
Ask the children to come up and point to the correct flash card showing the number that matches one you have said aloud.

What is worth more, four hundreds or 41 tens? ... six tens or 63 ones? ... seven thousands or 72 tens?

about 30 mins

Main activity: whole class

Write on the board some examples like the following:

5642 = ___ + 600 + 40 + 2
6948 = 6000 + ___ + 40 + 8
7592 = ___ + 500 + ___ + 2

Ask the children to come out and fill in the missing numbers.
Ask the children questions such as:

What does the digit 5 represent in 5642? … and the 6? … and the 4?
What does the digit 9 represent in 6948? … and the 8 and the 4?

Tell the children that they will be using their knowledge of place value and the 'Minimax' computer program to make the maximum or the minimum number possible from a set of digits. The computer will give them a number and they have to decide the best place to put that number in order to make the largest or smallest total.

Load 'Minimax' and choose Operator set to Addition, Number Size set to Th H T U, and Target set according to whether you want the maximum or minimum target. Press 'New Game'. The computer will present a digit for you to place in the sum.

Objectives

- Read and write whole numbers to at least 10 000 in figures and words, and know what each digit represents.
- Read and write the vocabulary of comparing and ordering numbers.
- Use known facts and place value to add or subtract mentally, including any pair of two-digit whole numbers.

Ask the children where they think would be the best place to put the first digit. For example, if a 9 is displayed and the sum is Th H T U + H T U, the 9 should be put in the Thousands because they will not get a higher number. If a 3 is displayed, they may get a larger number and so they should place the 3 in one of the Units or Tens places. Once each place is filled, the children work out the answer to the sum and enter it into the computer. If they are right they will get a 'Well Done' message; if not, they will be encouraged to try again. You may need to remind the children about the zero as a place holder if it comes up and explain what it means as a 'leading' zero if the only place it can be put is in the Thousands or Hundreds column. Look once more at the digits presented. Ask the children whether they could have made a larger/smaller number using these digits.

Main activity: group with computer

Set up the program on one or two computers for 6–8 children. Explain to the children that they are going to use the program once more to try and make the largest or smallest totals possible. They can choose whether they want an addition or subtraction sum each time. Tell the children to pay particular attention to the digits they are given; they should think carefully about whether they are likely to get a larger or smaller number subsequently and place the digits accordingly. Ask the children to record the sums they have made and their answers.

Other group activities

Cross number puzzle 1 Children work individually or in pairs to complete the crossword puzzle on Activity Sheet 7.1 with the clues in words and the answers in numbers. The correct answers are on Activity Sheet 7.2.

Cross number puzzle 2 Children work individually or in pairs to complete the crossword puzzle on Activity Sheet 7.3 with the clues in words and the answers in numbers. The correct answers are on Activity Sheet 7.4.

Make the biggest/smallest number Children pick one digit card from each of five different piles of cards that feature the numbers 0–9 several times, then make the biggest and smallest number they can, recording each answer in numbers and words. Repeat this several times with different cards.

about 10 mins

Plenary

Ask the children to explain what they have learned about place value. One group might explain that they found that the highest numbers could be made by selecting the bigger digits to go in the Thousands and Hundreds columns and the smaller ones to go in the Tens and Units columns. The opposite applied if they wanted to make the smallest number. Another group might explain that they had to match numbers to words and say the value of the digits in different columns. Finally, remind the children what they have learned in the lesson about place value.

Year 2

Using 'Monty' to explore a hundred square

Resources

'Monty', computer, number line, large 1–100 number square, individual 1–100 number squares, number cards in range 2–99, flash cards with numbers written in words, Activity Sheet 8.1 – Ten more, ten less, Activity Sheets 8.2a, 8.2b, 8.3 – Snake ladders

Vocabulary

ordinal, numbers, equal to, more than, less than, fewer than, greater than, smaller than, larger than, most, least, smallest, largest, order first, last, before, after, next, between, sequence

about 10 mins

Starter: whole class

Use the number line and ask the children to respond to questions such as:

What number comes after 16? … after 29? … before 11?
What number comes 2 after 20? … after 17?
What number comes 3 before 12? … before 20?
If I start at 23 and count on in tens, which numbers will I get to?
Start at 35, and count back in 5s.
Which tens number comes after 70? … before 20?

Write this sequence on the board: 33, 43, 53, 63. Ask the children to describe the sequence and then ask them what the next three numbers are. Write this sequence on the board: 45, 40, 35, 30. Ask the children to describe the sequence and then to count back to zero using this sequence.

Display a large 1 to 100 number square. Ask the children questions such as:

What is 1 more than 59? … than 53? … than 82? … than 71?
What number is 10 after 73? … 26? … 19?
What number is 10 more than 2? … than 56?
What number is 10 less than 63? … than 92?
Start at 61 and count back in 10s.

Main activity: whole class

Tell the children they will be using their knowledge of number up to and including 100 to count on and back and recognise simple sequences. Explain that they will be using a computer program called 'Monty'. In the program, Monty is a python who moves on a hundred grid. In the game they are going to play, the grid starts at 1 and goes up to 100. When Monty stops, his body will hide some numbers on the grid and they have to work out what they are. He will give us one number as a clue. Load the Monty program and set it to Grid 1. Press Start for a new game. Each time you press Start, the orientation of the grid will change, but it will always be a 1 to 100 grid. Start by choosing the orientation most appropriate to your class.

The grid will appear on the screen and stay there for 10 seconds. If your children need longer, adjust the timer accordingly. After that time the grid will disappear and Monty will start to move about, continuing until you click the mouse on the grid or he traps himself in a corner. When Monty stops he will display one of the numbers his body is hiding.

Discuss with the children where Monty is on the grid, and remind them of the way the numbers are sequenced. Ask them if they can predict one of the numbers Monty is hiding. Type in their guess and press Return. If they are right, the number will be

Objectives

- Order whole numbers to at least 100, and position them on a number line and a hundred square.
- Read and write whole numbers to at least 100 in figures and words.
- Describe and extend simple number sequences: count on or back in ones or tens, starting from any two-digit number.

displayed on Monty's back. If they are incorrect, but the number features somewhere on the grid, it will be displayed at that place. If the number is not on the grid, nothing will show. If your children need extra support you can click on the Sound button; a correct number sounds a pleasing tone and an incorrect number a beep.

Repeat, taking responses from the children until all the numbers are correctly identified and the 'Well Done' screen appears. Press Start to go back to the grid where all the numbers the children have given you will be displayed. As you play the game, ask questions such as:

> What number comes next? Why?
> If this number is above the one Monty has given us, how much bigger is it likely to be? If it is below, how much smaller will it be?

Main activity: group with computer

Set up the program on one or two computers for 6–8 children. Explain that they are going to use the program once more to try and guess the numbers that Monty is hiding, and tell them to pay particular attention to the orientation of the number grid, as that will help them guess the numbers. Ask the children to play the game several times, recording the numbers that they guess and circling the ones that Monty hid.

Other group activities

Number on a grid game Children take it in turns to pick up a card in the range 2 to 99. The first child looks at their card and decides where they would write it on a grid with the numbers 1 and 100 marked. Each child uses a different coloured pen. The winner is the first to get five of their colours in any row or column.

Ten more, ten less Children use Activity Sheet 8.1 to work out the correct number to go in the box. The number will be 10 more or 10 less than the starting number.

Snake ladders Children use Activity Sheet 8.2a or b to fill in the missing numbers on the 'Snake ladders'. Activity Sheet 8.3 is provided as an extension.

about 10 mins

Plenary

Conclude the lesson by getting the children to explain what they have learned about numbers on a hundred grid. One group might explain that when they were counting on or back in tens, they found the units stayed the same and the tens number changed. Another group could point out that they could work out the missing numbers by using the clue that Monty gave them and remembering which way the number sequence went.

Show the sequence of tens on a number grid and ask the children what each multiple of ten ends in. Write a selection of two-digit numbers on the board and ask individual children to come out and draw a ring around those that are multiples of 10. Hold up some flash cards with numbers written in words, and ask the children to say which ones are multiples of 10. You may want to have the number written on the back to confirm the children's answers. Finally, remind the children what they have learned in the lesson about numbers and number sequences up to and including 100.

Year 5

Using 'Monty' to explore a hundred square

Resources

'Monty', computer, number line, large 10 x 10 multiplication grid, Activity Sheets 9.1 and 9.2 – Multiple game, Activity Sheet 9.3 – Ring the multiples, Activity Sheets 9.4 and 9.5 – Multiple bingo

Vocabulary

next, consecutive, sequence, predict, continue, multiple, factor, divisible

about 10 mins

Starter: whole class

Use the number line and ask the children to chant in sixes from 0 to 60. Ask questions such as:

> What number comes next? ... and after that?
> Count back in sevens from 35. What happens when you get to zero? Can you go on?
> Starting at 64, count back in 8s. How many eights did you count?

Write this sequence on the board: 48, 56, 64, 72. Ask the children to describe the sequence.

> What are the next three numbers?

Write this sequence on the board: __, __, 49, 56, __, 70. Ask the children to describe the sequence and find the missing numbers. Now write this sequence: 9, 18, __, __, 45, __, 63. Ask the children to describe the sequence and find the missing numbers.

Say some numbers, such as 4, 18, 21, 28, 34, 42. Ask the children to hold them in their head and then say which ones are divisible by seven. Give the children another set of numbers, say 14, 16, 32, 34, 64 and 74. Ask the children to hold them in their head and then say which ones are divisible by eight.

about 35 mins

Main activity: whole class

Play the Multiple game. For this, you need the question cards from Activity Sheet 9.1 and the multiple cards on Activity Sheet 9.2. Show a 10 x 10 multiplication grid. Give out the multiple cards, which show multiples of 6, 7, 8, 9. Each child has a card, some showing two multiples, some only one. Put the children into two or three teams, then turn over a question card and read it out. The child or children who have the right answer hold up their card and call out the answer. The team that answers first scores one point. Some numbers will be reusable, as they are multiples of two or more numbers. The winning team is the one with most points at the end.

Tell the children that they will be using their knowledge of multiples to count on and back and recognise simple sequences. Explain that they will be using a computer program called 'Monty'. In the program, Monty is a python who moves on a hundred grid. They are going to play on Grid 4, which does not start at 1 but counts on in multiples of various numbers. When Monty stops, his body will hide some numbers on the grid, and they have to work out what those numbers are. He will give us one number as a clue. Load the 'Monty' program and set it to Grid 4. Press Start for a new game. Each time you press Start the orientation of the grid will stay the same, with the smallest number at the top left. The numbers on the grid are chosen at random and so you should select one appropriate for your class.

The grid will appear on the screen for 10 seconds. If your children need longer, adjust the timer accordingly. After that time the grid will disappear and Monty will start to move, continuing until you click the mouse on the grid or he traps himself in a corner. When Monty stops, he will display one of the numbers his body is hiding.

Discuss with the children where Monty is on the grid. Remind them of the way the grid numbers are sequenced. Can they predict one of the numbers Monty is

Objectives

- Recognise and extend number sequences formed by counting from any number in steps of constant size.
- Recognise multiples of 6, 7, 8, 9 up to the tenth multiple.

hiding? Type in their guess and press Return. If the guess is correct the number will be displayed on Monty's back. If the guess is incorrect but the number features somewhere on the grid, it will be displayed at that place. If the number is not on the grid, nothing will show. If your children need extra support you can click on the Sound button; a correct number will produce a pleasing tone and an incorrect one will produce a beep.

Repeat, taking responses from the children until all the numbers are correctly identified and the 'Well Done' screen appears. Press Start to go back to the grid where all the numbers the children have given you will be displayed. As you play the game, ask questions such as:

What number comes next? Why?
Can you recognise the sequence of numbers across the grid? ... down the grid?

Main activity: group with computer

Set up the 'Monty' program on one or two computers for 6–8 children. Explain that they are going to use the program to try and guess the numbers that Monty is hiding. Ask them to play the game several times, recording the numbers that they guess and circling the ones that Monty hid, and to record which numbers would appear if an extra row was added to the bottom of each of the grids they explore.

Other group activities

Multiple game A group of 6–8 children replay the game, dealing out all the cards equally.

Ring the multiples Children work through Activity Sheet 9.3, ringing the multiples of 6, 7, 8 and 9 displayed in each row.

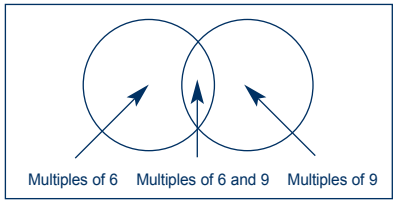
Multiple bingo You will need the bingo cards on Activity Sheet 9.4 and the number cards on Activity Sheet 9.5. The game is played by 6–8 children, each with a bingo card. One child acts as Caller; they turn over a number card and call out the number. The children check their bingo cards and cover the relevant number with a counter. The game can be played as 'full house', 'single row' or 'four corners' to win. To win the game, the child with the full row, corners or house shouts 'Multiple' and the Caller checks their card against the numbers called.

about 15 mins

Plenary

Ask the children to explain what they have learned about multiples. One group might explain that they could work out the missing numbers by using the clue that Monty gave them and recalling what they knew about multiples of 6, 7, 8 or 9. Another group might explain that some numbers were good to have, as they appeared as multiples of more than one number, for example, 36 is a multiple of 6 and 9.

To finish the lesson draw this Venn diagram on the board.



Write underneath it the following numbers; 6, 14, 24, 35, 63, 42, 54, 70, 36, 30, 18, 81, 63, 54. Ask individual children to come out and put the numbers in the right place on the diagram. Finally, remind the children what they have learned in the lesson about multiples of various numbers.

Year 2

Using 'Take Part' to explore fractions and shape and space

Resources

'Take Part', computer, plane shapes, solid shapes, templates, pinboards and elastic bands, squared paper, coloured sugar paper, sticky paper, dotted paper, large sheets of plain paper, 'Geoboard' Microworld from LCSI web site, http://www.microworlds.com/library/math/geoboard/index.html

Vocabulary

patterns, pinboard, rectangular, surface,equal, square, shape, flat, solid, edge, straight, corner, make, build, draw, one whole, one half, one quarter, part, fraction, divide: horizontally, vertically, diagonally

about 10 mins

Starter: whole class

Hold up some common plane shapes, such as a square, rectangle, circle and triangle. Ask some children to come out and pick out one of the shapes and describe the properties of that shape. If any are missed, invite the other children to describe them. Set up a small screen on your desk, with a selection of different plane shapes behind it. Pick a shape and describe one of its properties, for example, 'It has four sides.' The first child to identify the shape comes out to describe the next shape. If no one guesses correctly, describe additional properties of the shape.

about 30 mins

Main activity: whole class

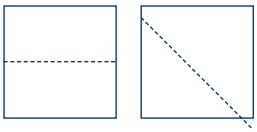
Hold up a large, square piece of coloured sugar paper. Fold it in half vertically.

What shape it is now?

Open up the paper and show it to the children.

What has happened to the square?

The children will see that folding the paper square produced a rectangle, and that re-opening it showed a square divided in half. Repeat this exercise twice with fresh squares of sugar paper, this time folding them horizontally and diagonally.



Load 'Take Part'. Choose Square by clicking on the tab. Press Reset at the top left of the controls. Tell the children that they are going to watch a short computer movie showing how a square can be divided into halves. The first movie is track 0:0 to 0:5. It can be stopped at any time to question the children about what they have seen, and can be replayed in normal or slow motion to reinforce a particular point. See the on-screen Help pages to find out how to do this.

While the sequence is playing, ask questions such as:

What fraction of the square is the green shape?
Is it still a half? Why?
When the half is split into two, what fraction is each part?
How many quarters make up one half?
How many quarters make up one whole?

When the movie reaches 0:5, press Stop, then Reset. If you need to play the movie again, press Play as before.

Select movie 2:0. Explain that the next sequence shows the square being divided in half in a different way. Press Play. Let the movie run through to 2:2. Press Stop. Ask the children to describe how the square was cut in half this time. The children

Objectives

- Begin to recognise and find one half and one quarter of shapes.
- Begin to recognise that two halves or four quarters make one whole, and that two quarters and one half are equivalent.
- Use mathematical names for common two-dimensional shapes.
- Sort shapes and describe some of their features, such as the number of sides and corners, symmetry.
- Make and describe shapes, pictures and patterns using, for example, solid shapes, templates, pinboards and elastic bands, squared paper.

will say that it turned round from the vertical (upright), passed through the corners (diagonals), then went straight across (horizontal) and through the other corner back to straight up. Reinforce the new vocabulary by writing it on the board and drawing a small diagram to show these movements.

Main activity: group with computer

Set up the program on one or two computers for 6–8 children. Explain that they are going to use the program to look again at the movies they have just watched and two others about halves and quarters. Show them how to operate the controls to play the movie in slow motion, to stop, replay and reset, and how to select new tracks. Ask them to pay particular attention to the relationship between halves and quarters and the different ways that the square can be divided.

After a while, show the children how to select the Quarters movie by clicking on the Quarter tab. Set the counter for 0:0 and play to 0:5, asking similar questions to those used with the whole class. When the children are confident about recognising a quarter, and can say that two quarters make a half and two halves make a whole one, move the counter to 1:0 and let the movie play through to 1:10.

Other group activities

Pinboard activities Children use a pinboard and elastic bands (or, if you have sufficient computers in the classroom, the LCSI Microworld 'Geoboard') to make a number of different squares, then more bands to divide them into halves and quarters in various different ways. The children should record their solutions on dotted paper.

Sticky paper activities Children use two different colours of sticky paper to make different squares and show them divided into halves and quarters. They then cut up their shapes and stick their solutions on to a large sheet of paper.

Guess my shape Children play the game you introduced as part of the starter activity. Ask a child to stand behind the screen and select a shape to describe. The others have to guess the shape, based on these descriptions. The first child to guess correctly then leads the activity.

about 10 mins

Plenary

Ask each group to say what they have learned. One group might say they learned there are two quarters in one half and two halves in one whole. Another group might show how to fold paper squares into halves and quarters. Put a range of plane shapes on to each table. Select a shape from behind the screen and describe one of its properties, for example, 'My shape has four sides.' The children discard all the shapes on the table that do not fit that description. Give more clues, such as 'All the corners are square', and 'All the sides are the same length.' Then ask which shapes are left on the table. Ask them to explain why there are only squares. Repeat several times with different shapes.

Draw some squares and circles on the board with halves and quarters shaded.

> What fractions are shaded?

Ask children to come out and point to all the halves, and then all the quarters. To finish, ask questions such as:

> If I cut a cake into quarters, how many pieces will I have?
> If I cut two identical pizzas into halves, how many people can have a piece?

Finally, remind the children what they have learned in the lesson about halves and quarters.

Year 6

Using 'Take Part' to explore fractions and shape and space

Resources

'Take Part', computer, plane shapes, solid shapes, nets, grids, Activity Sheet 11.1 – Reflection, Activity Sheet 11.2 – Make a tetrahedron

Vocabulary

parallel, sides, perpendicular, lines of symmetry, opposite, equal, trapezium, kite, rhombus, diagonal, intersect, rotation, bisect, reflection, adjacent, right-angled symetrical

about 10 mins

Starter: whole class

Display some plane shapes, including irregular ones such as a rhombus, kite, trapezium, scalene triangle and isosceles triangle. Ask some children to come out in turn, pick out one of the shapes and describe its properties, using terms such as parallel, right-angled, diagonal and symmetrical. If any properties are missed, invite the other children to describe them.

Put several different plane shapes, including the irregular ones, in a bag. Ask a child to feel in the bag for one of the shapes and hold it – but not to pull it out and show it to the rest of the class. Ask the rest of the children to try and work out what shape is being held by asking questions about its properties, such as

'Are two adjacent sides equal?', 'Does it have any right-angles?' or 'Are any of the sides parallel?'

Any child who thinks there are sufficient clues to name the shape raises a hand and names the shape. The child holding the shape then reveals it to check their answer.

about 35 mins

Main activity: whole class

Draw a range of triangles on the board. Remind the children about reflective symmetry by holding a mirror in various positions to see whether the triangle has any lines of symmetry. Draw on any lines of symmetry that have been identified. Draw an 8 3 6 grid (or use a prepared one) and mark or place on it a shape such as a right-angled triangle.

Show where the shape will end if it is reflected about the vertical axis. Ask a child to come out and show where it will finish if it is reflected about the horizontal axis. Tell the children that they are going to think about ways of dividing an equilateral triangle into thirds. Draw an equilateral triangle on the board. How could it be divided? Try out any suggestions, and discuss if they really are showing thirds.

Load 'Take Part' and choose Third by clicking on the tab. Press Reset at the top left of the controls. The first movie is track 0:0 to 0:6. It can be stopped at any time to question the children about what they have seen, and can be replayed in normal or slow motion to reinforce a particular point. See the on-screen Help pages to find out how to do this. While the movie is playing, ask questions such as:

What shapes did you spot as the colours were rotating?
Is it still a third? Why?
When the shapes rotate are they each still a third of the triangle? Why?
How many thirds make up one whole?

At 0:6, press Stop and Reset. If you need to play the movie again, press Play.

Select movie 1:0. Explain that the next movie will show the triangle being divided again in a different way. Play the movie to 1:4. If necessary, replay several more

Objectives

- Recognise relationships between fractions.
- Describe and visualise properties of solid shapes, such as parallel or perpendicular, faces or edges.
- Classify shapes, using criteria such as parallel sides, equal angles, equal sides.
- Recognise where a shape will be after a reflection.
- Recognise where a shape will be after two translations.

times, using slow motion for emphasis. Ask the children to describe how the triangle has been further cut into thirds. Ensure that they understand that some parts have been reflected or rotated to make new shapes that could be cut and refitted to form the original thirds of the triangle. Reinforce any new vocabulary by writing it on the board and perhaps drawing a small diagram.

Main activity: group with computer

Set up the 'Take Part' program on one or two computers for 6–8 of the more able children. Explain that they are going to use the program once more to look at more of the movie featuring thirds and sixths. Show the children how to operate the controls to play the movie in slow motion, to stop, replay and reset, and to select new tracks.

Suggest that they stop after each new step in the movie. Discuss with them the relationship between thirds and sixths and the different shapes made as the triangle is divided, noticing any 'optical illusions' of 3-D shapes as they appear. Ask the children to record some of the patterns they have seen on triangular graph paper or with coloured sticky paper.

Other group activities

Reflection activity Give out copies of Activity Sheet 11.1 or similar grid (minimum size 8 3 6), one for every two children. Ask them to use plane shapes, acetate shapes or cardboard shapes to show where the shapes would end up if they were rotated about the vertical or horizontal axes.

Make a tetrahedron Give every child a copy of Activity Sheet 11.2, the net of a tetrahedron. Explain how to cut out the shape and fold and stick each side and edge. When they have completed their shape, ask them to work in pairs to complete the following sentences:
Our shape is called a triangle/pyramid/tetrahedron/cube.
Our shape has ___ faces.
Each face is a _____ shape.
Each side is equal/not equal in length.

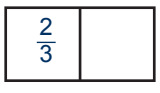
about 10 mins

Plenary

Ask each group to say what they have learnt. One group might say they learnt that there are three thirds in one whole and two sixths in one third or six sixths in one whole. Another group could show how they reflected their shapes around a grid.

On a fraction wall draw one whole and then ask the children to come out and show two halves, three thirds and six sixths. The completed wall will look like this.

Ask the children how many sixths make one half.
Put up or draw some fraction cards showing thirds, sixths, halves and quarters and one side left blank.



The children come out and write on an equivalent fraction on the blank side of the card, in this case they will answer $\frac{4}{6}$.

To finish the lesson, ask some questions like: 'If I cut a cake into thirds how many pieces will I have?' 'If I cut two identical pizzas, into sixths how many people can each have a piece?'

Finally, remind the children what they have learnt in the lesson about thirds and sixths.

Year 2

Using 'Toy Shop' to solve problems with money

Resources

'Toy Shop', computer, set of large display coins, target price cards, coins to £2, cloth bag, objects to buy, Activity Sheet 12 – Purses to £2

Vocabulary

how much? coin, pound, pence, price cost, pay, cost more, cost less, total

about 10 mins

Starter: whole class

Ask the children to call out the name of the coins as you hold them up. Display large coins on the board. Ask the children how much money there is in total. Ask the children to total the following amounts: 20p, 10p, 5p; 1p, 5p, 50p; £1.20p, 50p, 2p, 1p.

Hold up an object such as a comic, showing the price. Invite a child to pay for the comic using the coins provided. Repeat this several times with different priced objects.

Ask the children to respond to oral problems, such as:

> Anil bought three chocolate bars at 15p each, how much change will he get from 50p?

Ask them how they arrived at their answer. Hold up some cards with target prices such as: 23p, 31p or 42p.

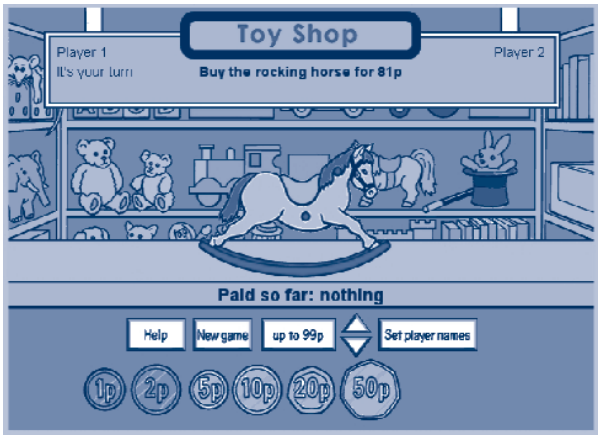
> Which three coins can be used to make each target?

about 25 mins

Main activity: whole class

Tell the children that they will be using their knowledge of coins and money in a computer program called 'Toy Shop', where players take turns to put a coin towards buying a toy. The object of the game is to pay the last coin and win the toy. Load the 'Toy Shop' program and set it to Level 2 (up to 99p). Choose an example of a toy for the children to try to buy. Press New Game if the example which appears needs to be changed.

Split the class into two teams. Click on the Set Player Names button and enter the chosen team names into the dialogue window. Ask the children in Team 1 to suggest an amount to be paid towards the cost of the toy. Click on the appropriate coin to pay. It is now Team 2's turn. The running total is shown on the shop counter front to help them remember how much has



Objectives

- Use mental addition and subtraction, simple multiplication and division to solve simple word problems involving numbers in 'real life', money or measures using one or two steps.
- Recognise all coins and begin to use £.p notation for money. Find totals, give change and work out which coins to pay.

been paid already. The teams take it in turns to place a coin until the last amount has been played. Play the game several times with different toys.

Discuss with the children the strategies for winning the toy. For example, if the amount left to be paid is 3p, it does not matter whether a team lays down a 1p or a 2p coin, as the other team can always win by laying down the other value. The 'secret' of winning in this game is that you should never leave the other team an amount that can be paid with a single coin.

Main activity: group with computer

Set up the program on one or two computers for 6–8 children, and set it to Level 3 (up to £2.49). Explain that they are going to use the same program to try and buy more expensive toys, using totals up to £2.49. The toys and amounts will vary each time they choose New Game. Tell the children that if they try to pay too much, a message will appear on the Toy Shop sign.

Split each group into two teams, and ask the children to record which coins they pay towards the toy using play coins. Does the team that pays the most towards the toy always win?

Other group activities

Dipping game Children take it in turns to pull three play coins from a covered box or bag full of play coins. The first child totals their coins and looks at a chart of goods you have prepared and decides which they can buy using their coins. They select something to buy and record it by drawing a picture and noting down any change they may have. If they do not have sufficient funds to buy an object they must choose something they can afford.

Change game Children work in pairs and take it in turns to pull three coins from a covered box or bag which is full of play coins up to and including 50p. The first child totals their coins and their partner has to say how much more would be needed to make it up to £2. They record their calculations in the purses on Activity Sheet 12.

about 10 mins

Plenary

Conclude the lesson by getting the children to explain what they have learned about coins and money in the lesson. One group might explain that they found that in order to win the toy they had to make sure they laid the last coin. Another might explain that in order to buy something they had to have the right amount of money or more.

Ask the class to work out the following puzzles.

> Gita spent 24p. She spent 8p more than Josh. How much did Josh spend?
> Anita takes two coins of the same value from her purse. What is the most she can have? What is the least amount she can have?

Finally, remind the children what they have learned in the lesson about coins and money.

Year 4

Using 'Toy Shop' to solve problems with money

Resources

'Toy Shop', computer, set of large display coins, objects to buy, Activity Sheet 13.1 – Purses to £10, Activity Sheets 13.2 and 13.3 – Coins in a line, Activity Sheet 13.4 – Money loop game

Vocabulary

money, coin, pound, pence, price, cost, cheaper, pay, more expensive, change, total, amount

about 10 mins

Starter: whole class

Ask the children to respond rapidly to shopping problems such as the following:

A jigsaw costs 65p, how many can you buy for £2? How much change would you get?
A bucket and spade costs £1.60. How many could you buy for £5?
Natalie has three 50p coins and four 20p coins. She buys a teddy bear for £1.30. How much does she have left?
Tamzin bought three wooden lorries at £1.36 each. What would her change be from £10?

Ask the children to consider how they would pay the following amounts with some restrictions on the coins they can use.

£1.96 no 50p allowed
£2.80 no 20p allowed
£1.35 no 10p allowed
£3.19 no £1 allowed

Ask the children to total these amounts: 20p, 10p, 5p, 20p, 50p; 1p, 5p, 50p, £1, £2, 50p; 2p, 20p, 50p, 2p, 1p, 5p, 10p. Make a note of the totals on the board. Ask the children to take each of the previous answers in turn and pay the amount with the fewest coins. For example:

£1.05 pay with two coins
£4.06 pay with four coins
£0.90 pay with three coins

about 30 mins

Main activity: whole class

Tell the children that they will be using their knowledge of coins and money in a computer program called 'Toy Shop'. In the program, players take turns to put a coin towards buying a toy. The object of the game is to place the last coin in order to win that toy. Load 'Toy Shop' and set it to Level 3 (up to £2.49p). Choose an example of a toy for the children to try to buy. Press New Game if the example which appears needs to be changed.

Split the class into two teams. Click on the Set Player Names button and enter the chosen team names into the dialogue window. Ask the children in Team 1 to suggest an amount to be paid towards the cost of the toy. Click on the appropriate coin to pay. It is now Team 2's turn. The running total is shown on the shop counter front to help them remember how much has been paid already. The teams take it in

Objective

- Use all four operations to solve word problems involving money using one or more steps, including converting £s to pence and vice versa.

turns to place a coin until the last amount has been played. Play the game several times with different toys.

Discuss with the children the strategies for winning the toy. For example, if the amount left to be paid is 3p, it does not matter whether a team lays down a 1p or a 2p coin, as the other team can always win by laying down the other value. The 'secret' of winning in this game is that you should never leave the other team an amount that can be paid with a single coin.

Main activity: group with computer

Set up the 'Toy Shop' program on one or two computers for 6–8 children. Explain that they are going to use the program again to try and buy toys. The toys and amounts will vary each time they choose New Game. If they try to pay too much, a message will appear on the Toy Shop sign.

Split the group into two teams per computer. Ask the children to record which coins they pay towards the toy using play coins. Ask them to think about the coin they are putting towards the toy, and how that might affect the choice made by the other team. Is it always the team that pays the most towards the toy that wins?

Other activities

Change game Working in pairs, children take it in turns to pull three coins from a covered box or bag full of play coins including £1 and £2 coins. The first child totals their coins and their partner has to say how much more would be needed to make it up to £10. They record their calculations in the purses on Activity Sheet 13.1.

Coins in a line You will need the board provided on Activity Sheet 13.2 and the spinners on Activity Sheet 13.3. Working in pairs, children take it in turns to spin a coins spinner and a number spinner. They multiply the coin value by the number to get a total, and place a counter on that amount on the board. The first child to connect the amounts from one side of the board to the other wins. If no child crosses the entire board, the winner is the one with the most connections made.

about 10 mins

Plenary

Ask the children to explain what they have learned about coins and money in the lesson. One group might explain that they found in order to win the toy they had to plan their moves in advance. Another group might explain that in order to successfully connect the diamonds they had to multiply amounts of money and cover the correct amount on the grid.

Give out all the loop cards from Activity Sheet 13.4. Give some children more than one card if necessary. Take a card and read out the bottom statement. The child who has the card with the correct answer on it reads out their top statement. Repeat until the class arrive back at the starting point on your original card. Finally, remind the children what they have learned in the lesson about coins and money.

Year 3

Using an interactive whiteboard to count on in tens

Resources

'Easiteach' computer, digital projector, interactive whiteboard,
Activity Sheet 14 – Number lines

Vocabulary

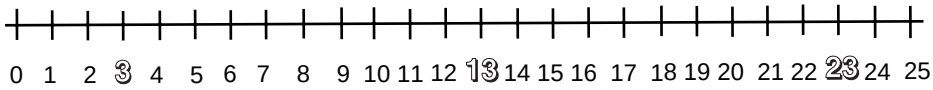
count on, count back, add, digit, altogether, multiple, tens, number

about 10 mins

Starter: whole class

Click on page 1 on the whiteboard to display the vocabulary used in the lesson. Highlight these words on the board at appropriate times during the lesson. Discuss the meaning of the words as you go along.

Click on page 2 on the whiteboard display to show the 0–100 number line with all the markers and all the numbers shown. Chant round the class in tens. Beginning with 10, count forward and back to 100. Then start on any number, and count forwards and backwards. Point to the number line and highlight the numbers as the children count.



about 30 mins

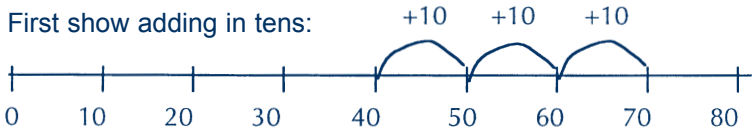
Main activity: whole class and pairs

Click on page 3 on the whiteboard display to show the 0–100 line with the tens numbers only marked, no other markers. Ask children to add 40 to 30, and to explain their method.

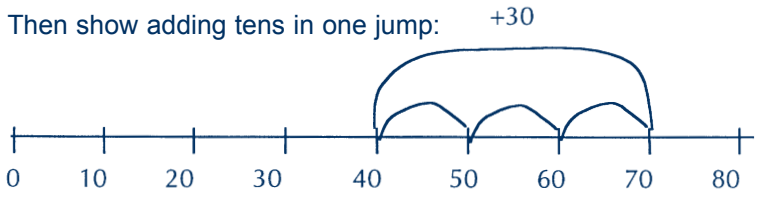
Show the children how to make jumps to add multiples of 10.

Click on page 4 on the whiteboard display to magnify a section of the line. Draw jumps on the line as you demonstrate.

First show adding in tens:



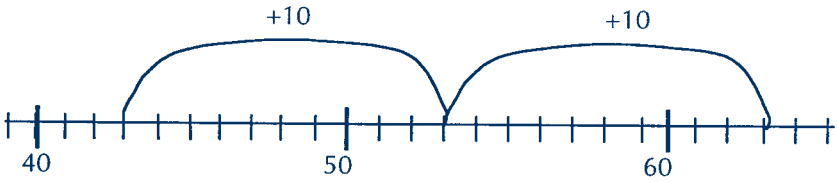
Then show adding tens in one jump:

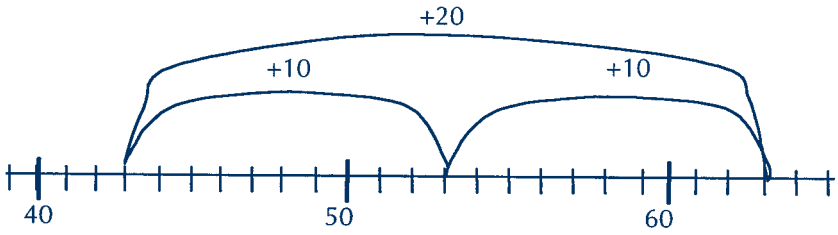


Objectives

- Count on or back in tens, starting from any two-digit number.
- Say the number that is 10 more or 10 less than any given two-digit number.
- Add a two-digit number to a multiple of 10.

Click on page 5 on the whiteboard display to show a section of the 0–100 line with all the markers and the tens numbers. Now ask the children to add a multiple of 10 to a two-digit number, such as 43 + 20. Demonstrate on the number line. Show how the starting ones digit is the same as the ending ones digit.





Ask the children to suggest five numbers between 20 and 50. Write these on the board. For example, they may suggest: 21, 33, 45, 28, 36.

Main activity: pairs

Working in pairs, the children should add 20 or 30 to each of these numbers, recording their methods on Activity Sheet 14.

Suggest to the children that they show the jumps of 10 first, then the complete jump.

Ask the children questions such as:
If I finished on 56 and I added 20, how could you work out what number I started at?

about 10 mins

Plenary

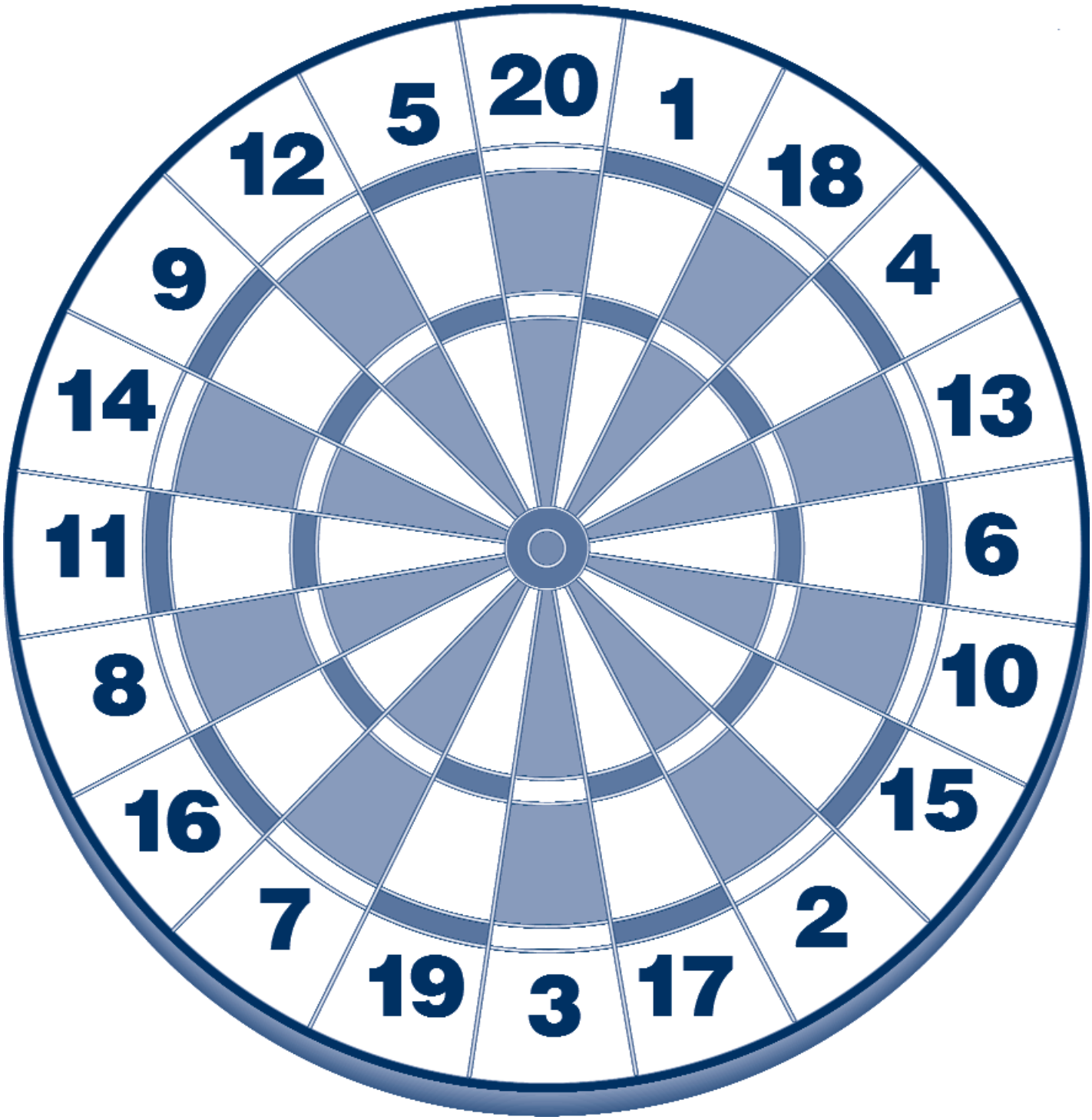
Click on page 6 on the whiteboard display to show a section of the 0–100 line with all the markers and the tens numbers. Invite some children to show their method on the number line. You could save these recordings for another lesson.

Remind the children that:

- it is quicker to add a multiple of 10 in one big jump;
- when adding a multiple of 10, the ones digit you start on is always the same as the ones digit you end on.

Activity Sheet 5

Dartboard



Activity Sheet 6.1

Step up

Name _____

In one step make 5 into 75	5 add 70 makes 75
In one step make 7 into 47	
In one step make 9 into 39	
In one step make 3 into 63	
In one step make 8 into 38	
In one step make 9 into 49	
In one step make 7 into 67	
In one step make 6 into 56	
In one step make 2 into 32	
In one step make 1 into 21	
In one step make 4 into 84	

Activity Sheet 6.2

Step down

Name _____

In one step make 49 into 9

49 subtract 40 makes 9

In one step make 56 into 6

In one step make 27 into 7

In one step make 38 into 8

In one step make 76 into 6

In one step make 43 into 3

In one step make 31 into 1

In one step make 59 into 9

In one step make 67 into 7

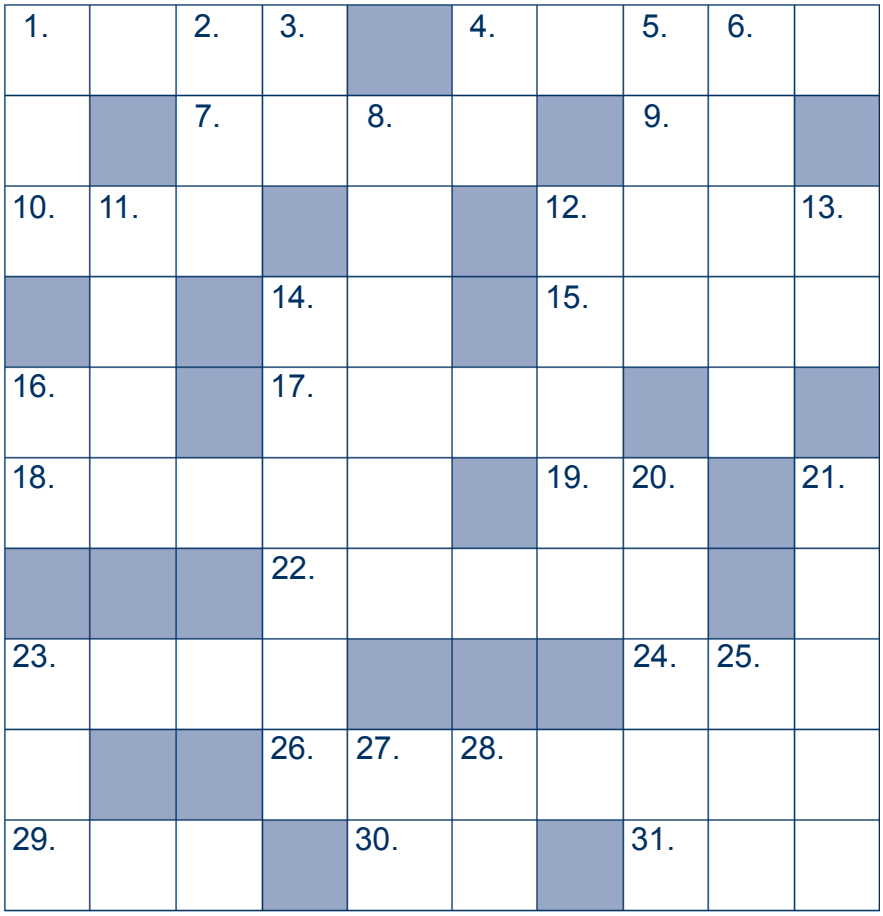
In one step make 17 into 7

In one step make 94 into 4

Activity Sheet 7.1

Cross number puzzle 1

Name _____



Clues down

1. Four hundred and five
2. Two hundred and ninety
3. Eighty
4. Twenty-one
5. Seven thousand six hundred and four
6. Ninety-seven thousand six hundred and twenty-five
8. Four hundred and two thousand nine hundred and seventy-eight
11. One thousand and forty
12. Nineteen thousand four hundred and twenty-seven
13. Forty-six
14. Five hundred and twenty-four thousand six hundred and twenty-six
16. Ninety-eight
20. Ninety-one thousand four hundred and twenty-five
21. Sixty thousand seven hundred and thirty
23. Five hundred and sixty-four
25. Nine hundred and nine
27. Forty-three
28. Twenty

Clues across

1. Four thousand six hundred and twenty-eight
4. Twenty thousand seven hundred and ninety-one
7. Nine thousand and forty-one
9. Sixty-seven
10. Five hundred and ten
12. One thousand and sixty-four
14. Fifty-two
15. Nine thousand four hundred and twenty-six
16. Ninety-four
17. Two thousand nine hundred and four
18. Eighty thousand and forty-seven
19. Twenty-nine
22. Sixty-eight thousand and seventy-one
23. Five thousand and two
24. Four hundred and ninety-seven
26. Six million four hundred and twenty-six thousand two hundred and three
29. Four hundred and sixty
30. Thirty
31. Five hundred and ninety

Activity Sheet 7.2

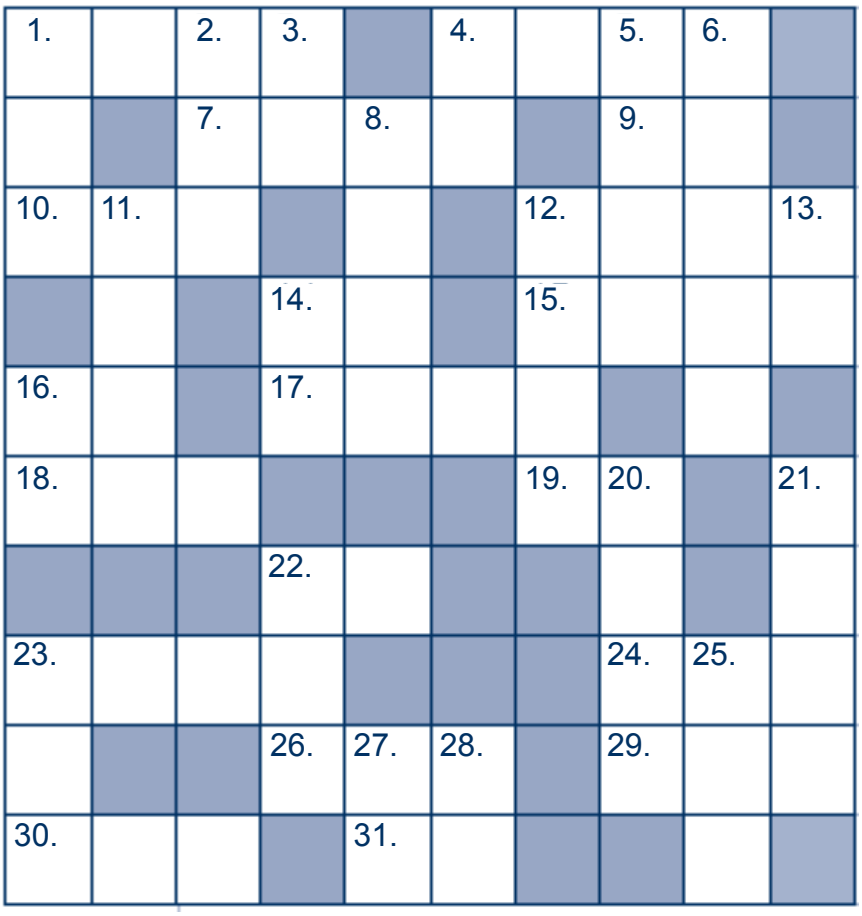
Answers to Cross number puzzle 1

1. 4	6	2. 2	3. 8		4. 2	0	5. 7	6. 9	1
0		7. 9	0	8. 4	1		9. 6	7	
10. 5	11. 1	0		0		12. 1	0	6	13. 4
	0		14. 5	2		15. 9	4	2	6
16. 9	4		17. 2	9	0	4		5	
18. 8	0	0	4	7		19. 2	20. 9		21. 6
			22. 6	8	0	7	1		0
23. 5	0	0	0				24. 4	25. 9	7
6			26. 6	27. 4	28. 2	6	2	0	3
29. 4	6	0		30. 3	0		31. 5	9	0

Activity Sheet 7.3

Cross number puzzle 2

Name _____



Clues down

1. Five hundred and two
2. Three hundred and sixty
3. Fourteen
4. Sixteen
5. One thousand two hundred and eighty-three
6. Two thousand four hundred and fifteen
8. Eight thousand and sixty-three
11. One thousand and ninety-seven
12. Three thousand four hundred and eleven
13. Twelve
14. Forty-one
16. Eighteen
20. One thousand and thirty-six
21. Six thousand and twelve
22. One hundred and thirteen
23. Three hundred and thirteen
25. Four hundred and fifty
27. Fifty-one
28. Eighty-seven

Clues across

1. Five thousand and thirty-one
4. One thousand four hundred and twelve
7. Six thousand four hundred and eighty-six
9. Twenty-four
10. Two hundred and ten
12. Three thousand eight hundred and eleven
14. Forty-six
15. Four thousand three hundred and fifty-two
16. Nineteen
17. One thousand three hundred and eighty-one
18. Eight hundred and seventy-three
19. Eleven
22. Thirteen
23. Three thousand and seventy-one
24. Three hundred and forty-one
26. Three hundred and fifty-eight
29. Six hundred and fifty-two
30. Nine hundred and twenty-six
31. Seventeen

Activity Sheet 7.4

Answers to Cross number puzzle 2

1. 5	0	2. 3	3. 1		4. 1	4	5. 1	6. 2	
0		7. 6	4	8. 8	6		9. 2	4	
10. 2	11. 1	0		0		12. 0	12. 3	8	13. 1
	0		14. 4	6		15. 4	3	5	2
16. 1	9		17. 1	3	8	1			
18. 8	7	3				19. 1	20. 1		21. 6
			22. 1	3			0		0
23. 3	0	7	1				24. 3	25. 4	1
0			26. 3	27. 5	28. 8		29. 6	5	2
30. 9	2	6		31. 1	7			9	

Activity Sheet 8.1

Ten more, ten less

Name _____

10 more is

60	→	
80	→	
30	→	
45	→	
67	→	
89	→	
7	→	
18	→	
29	→	

is 10 less than

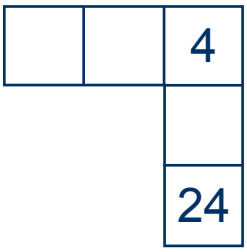
32	→	
19	→	
48	→	
88	→	
61	→	
53	→	
17	→	
3	→	
74	→	

Activity Sheet 8.2a

Snake ladders

Name _____

1.



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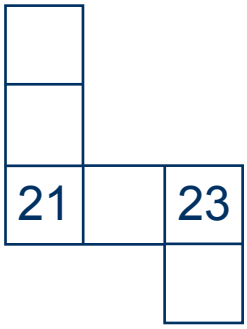

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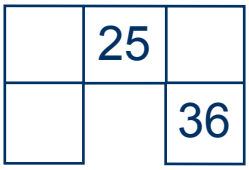

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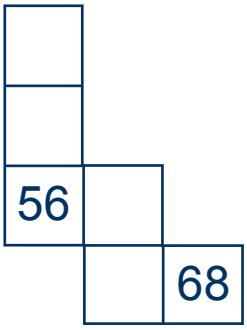

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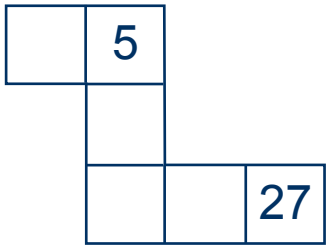

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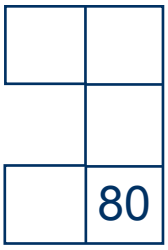

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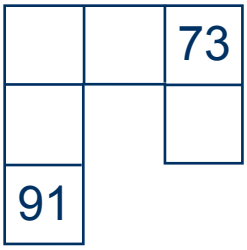

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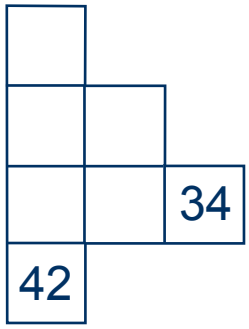

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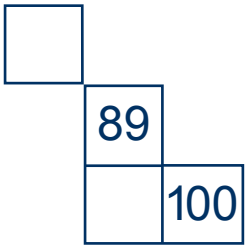
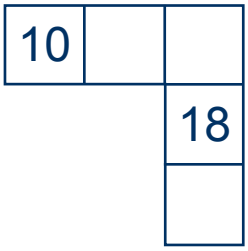


Activity Sheet 8.2b

Blank snake ladders

Name _____

1.



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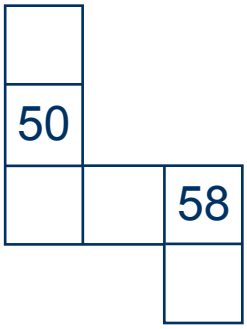

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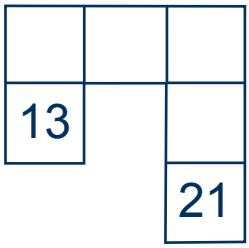

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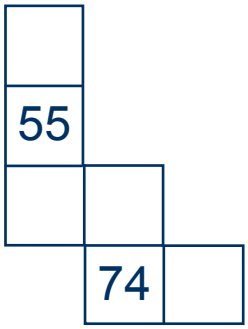

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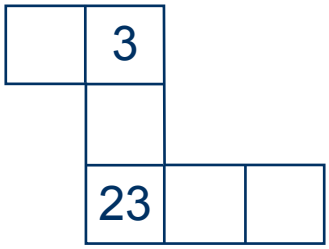

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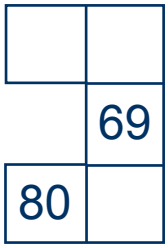

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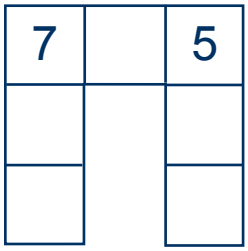

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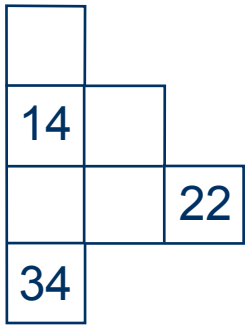

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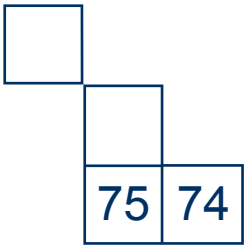
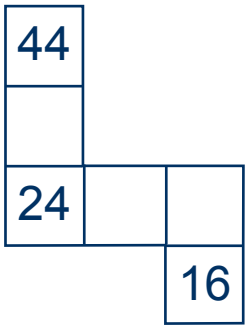


Activity Sheet 8.3

Blank snake ladders

Name _____

1.



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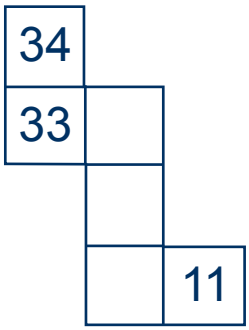

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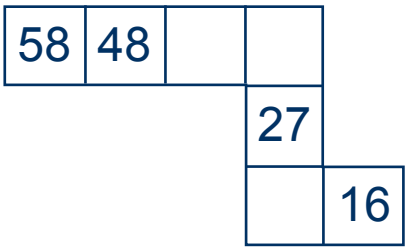

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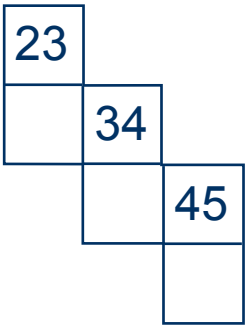

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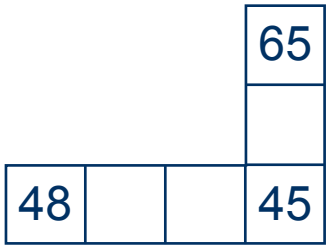

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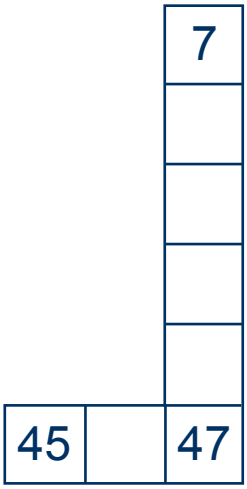

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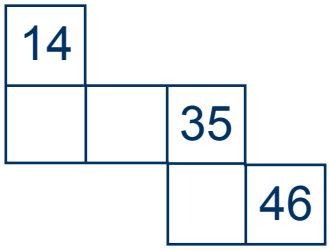

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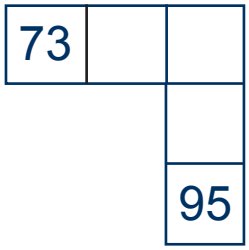

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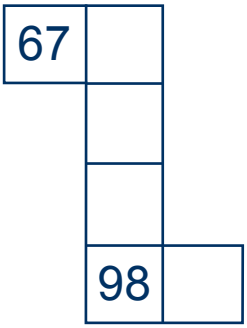


Activity Sheet 9.1

Question cards for the Multiple game

the first multiple of six	the first multiple of seven	the first multiple of eight	the first multiple of nine
the second multiple of six	the second multiple of seven	the second multiple of eight	the second multiple of nine
the third multiple of six	the third multiple of seven	the third multiple of eight	the third multiple of nine
the fourth multiple of six	the fourth multiple of seven	the fourth multiple of eight	the fourth multiple of nine
the fifth multiple of six	the fifth multiple of seven	the fifth multiple of eight	the fifth multiple of nine

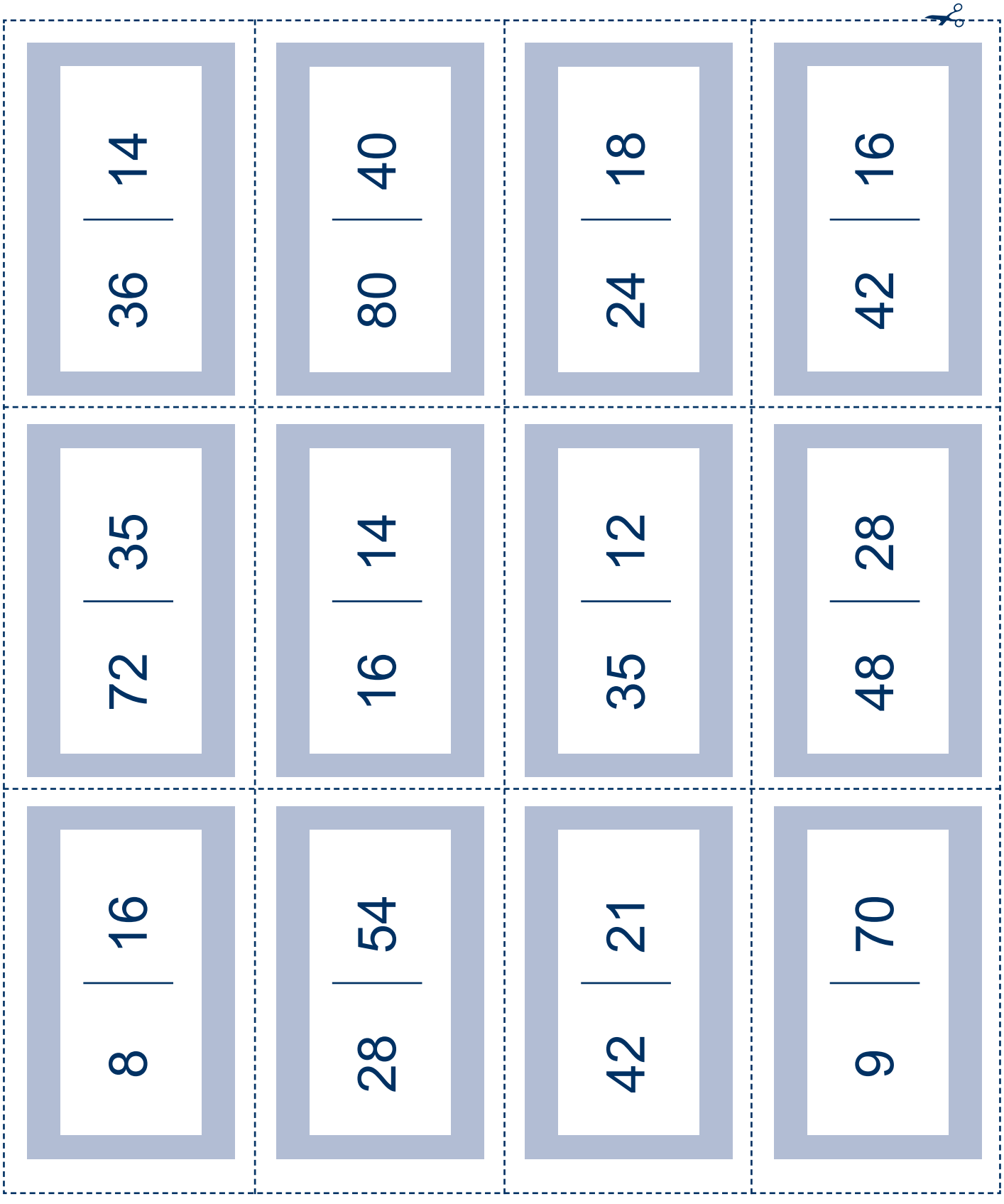
Activity Sheet 9.1 continued

Question cards for the Multiple game

the sixth multiple of six	the sixth multiple of seven	the sixth multiple of eight	the sixth multiple of nine
the seventh multiple of six	the seventh multiple of seven	the seventh multiple of eight	the seventh multiple of nine
the eighth multiple of six	the eighth multiple of seven	the eighth multiple of eight	the eighth multiple of nine
the ninth multiple of six	the ninth multiple of seven	the ninth multiple of eight	the ninth multiple of nine
the tenth multiple of six	the tenth multiple of seven	the tenth multiple of eight	the tenth multiple of nine

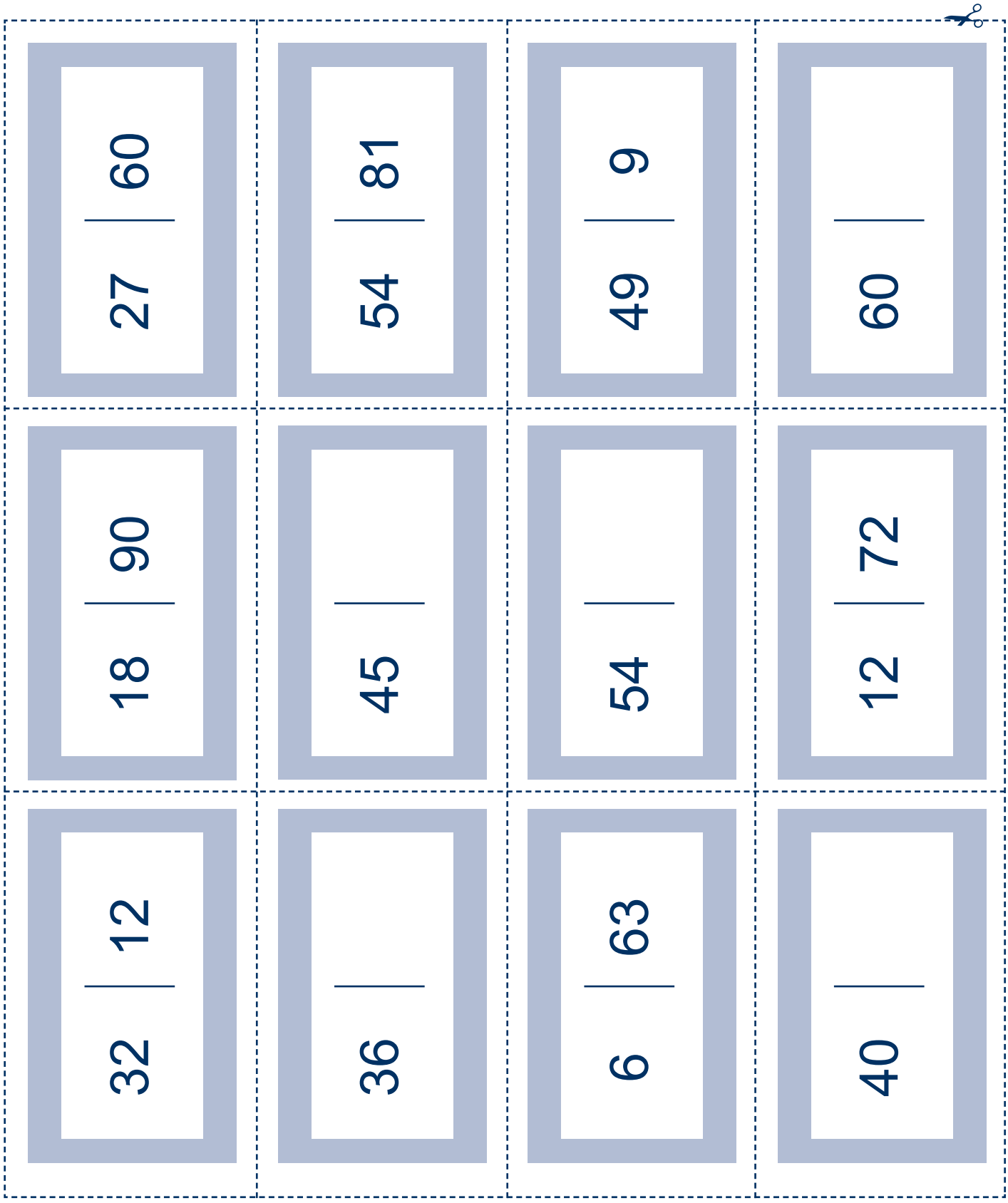
Activity Sheet 9.2

Multiple cards for the Multiple game



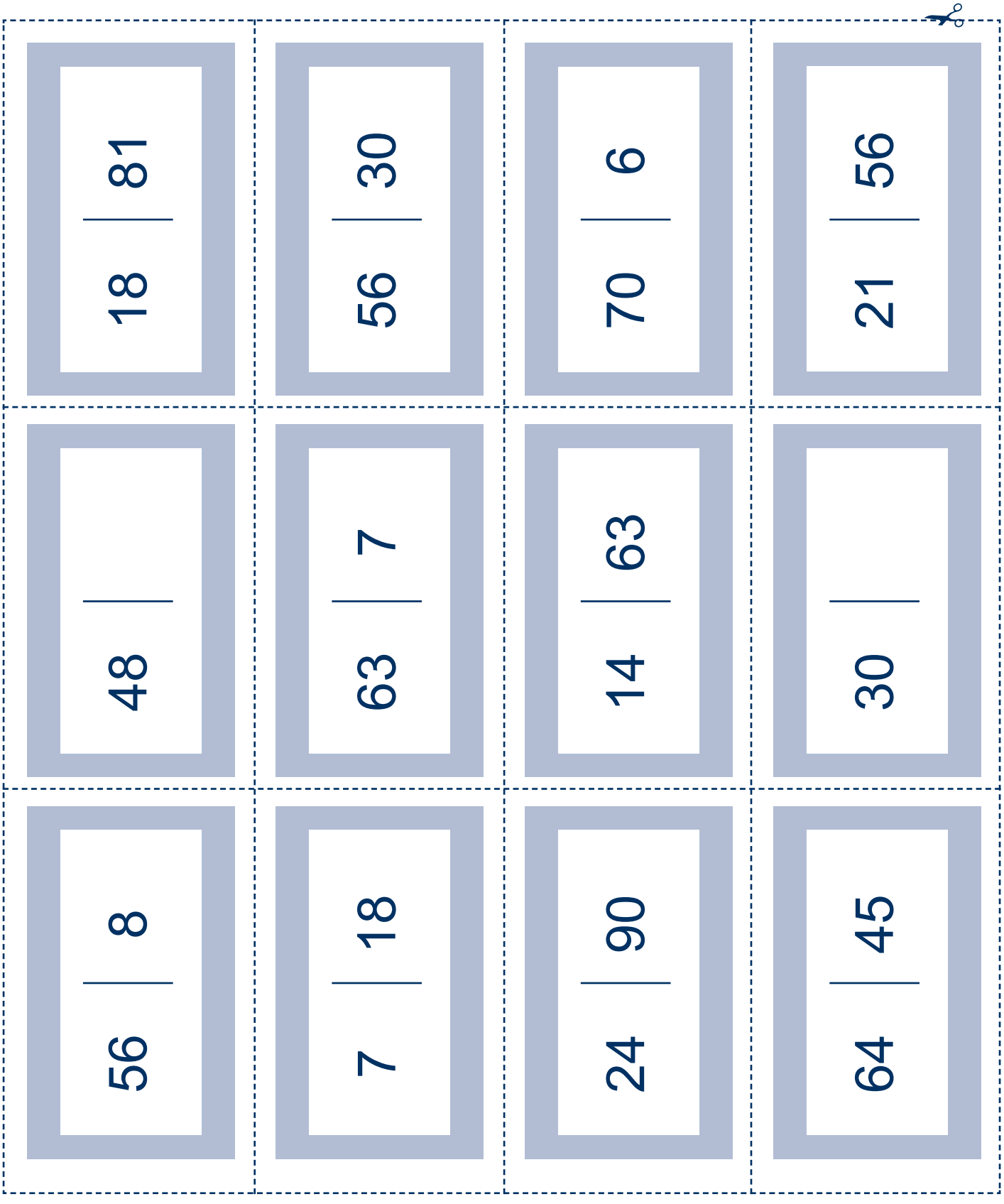
Activity Sheet 9.2 continued

Multiple cards for the Multiple game



Activity Sheet 9.2 continued

Multiple cards for the Multiple game



Activity Sheet 9.3

Ring the numbers that are the correct multiple

Name _____

Ring the multiples

Multiples of 7	3 21 25 35 53 63 68 70
Multiples of 9	9 22 36 37 45 63 81 88
Multiples of 8	12 16 30 32 42 56 62 64
Multiples of 6	12 19 72 48 41 36 5

Activity Sheet 9.4

Bingo cards

9	27	81	16
36	14		7
6	80	18	42
	24	28	

6	81	16	49
28		36	54
24	72		
18	21	27	72

27	54	6	90
16		8	56
42	63	35	
	36	40	21

	14	56	60
9	30		7
63	24	64	18
42		21	32

Activity Sheet 9.4 continued

Bingo cards

64	30	45	6
35	18		72
32	48	42	
	80	7	

54	32	12	
14		7	70
42	60	56	
	16	21	72

28	32	48	
	8	35	63
24		9	70
81	72	54	12

	63	7	90
35	21		42
12	8	18	24
72		56	81

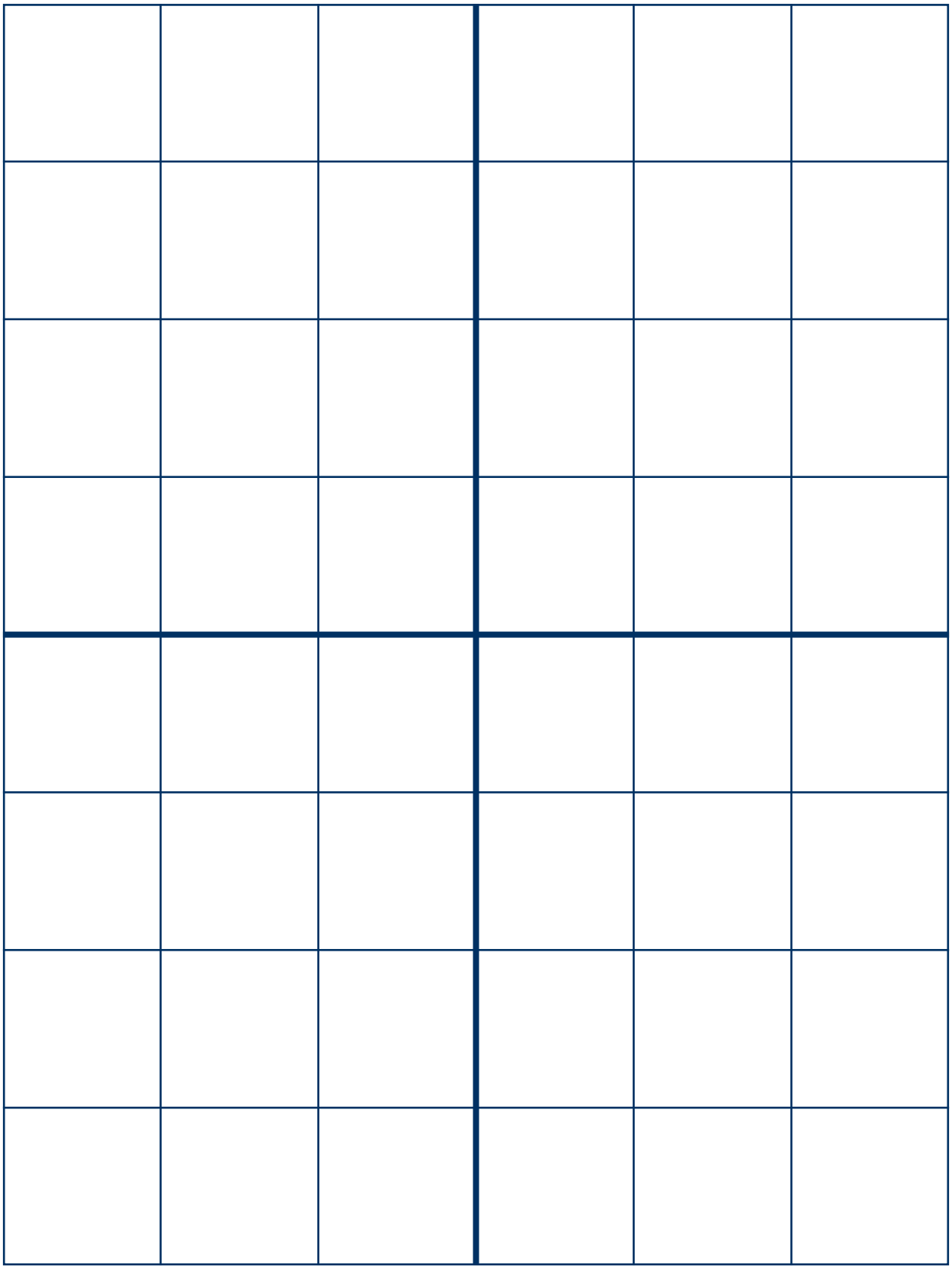
Activity Sheet 9.5

Multiple bingo

6	7	8	9
12	14	16	18
18	21	24	27
24	28	32	36
30	35	40	45
36	42	48	54
42	49	56	63
48	56	64	72
54	63	72	81
60	70	80	90

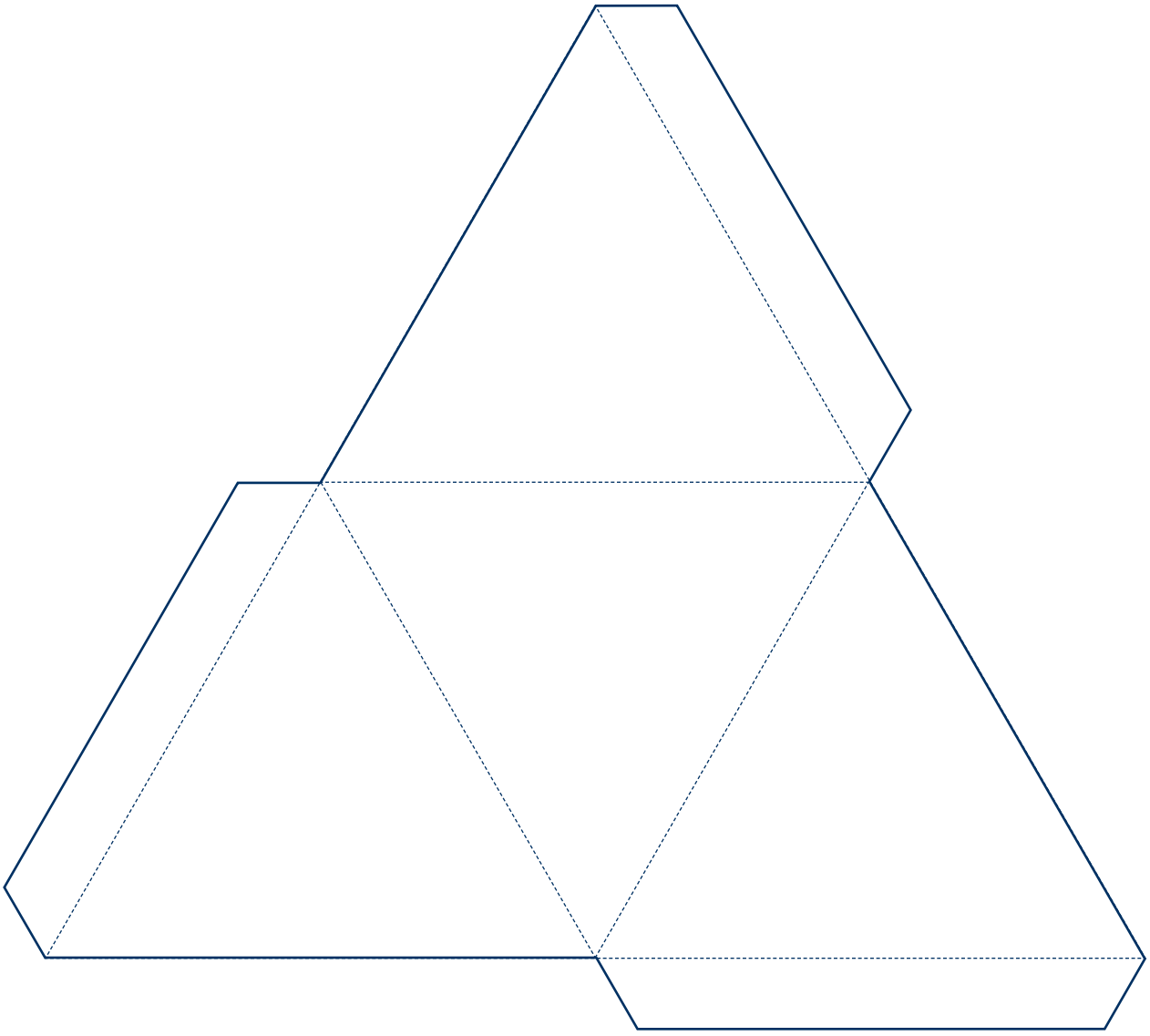
Activity Sheet 11.1

Reflection



Activity Sheet 11.2

Make a tetrahedron

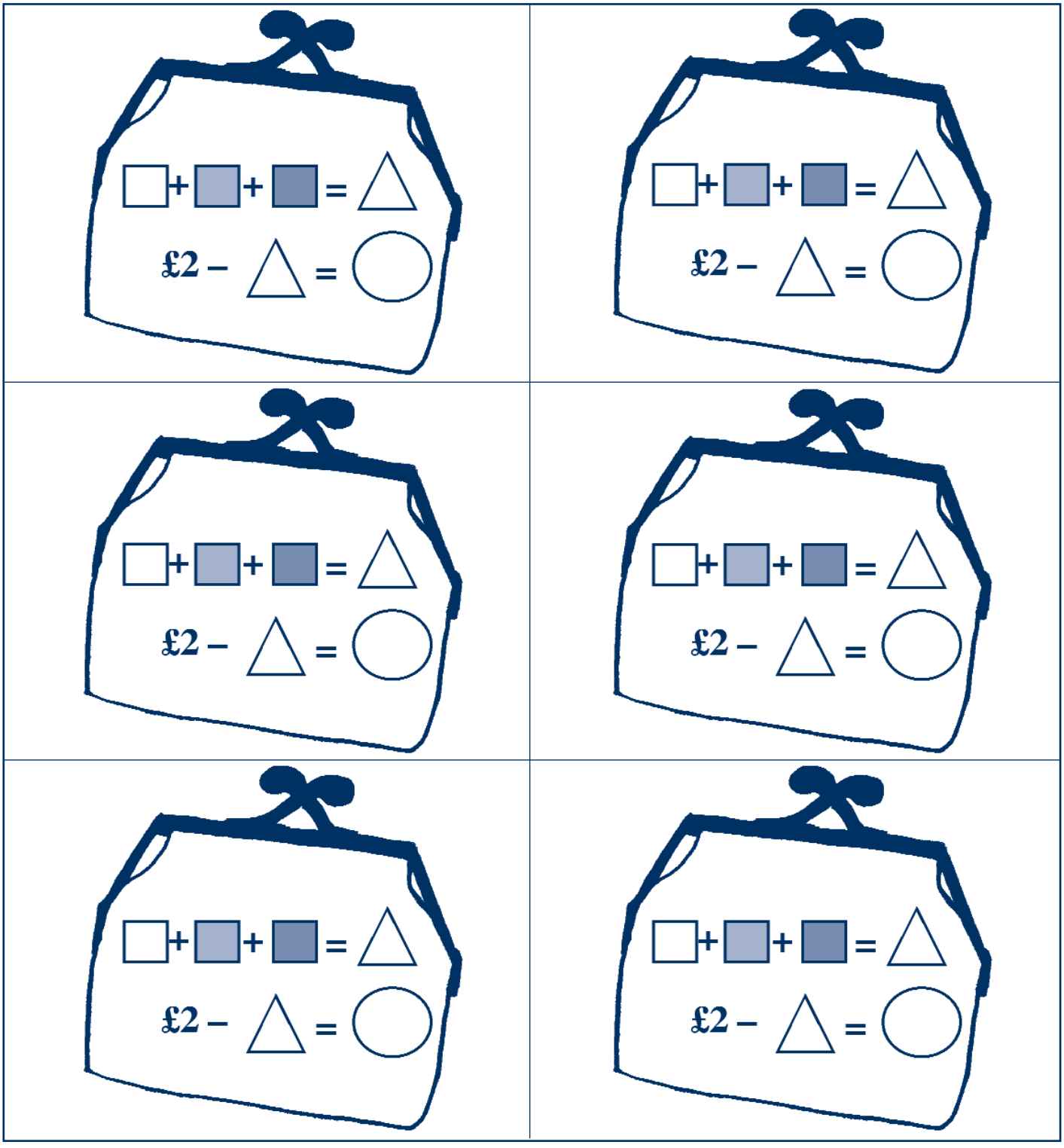


- Our shape is called a _____
- Our shape has _____ faces
- Each face is a _____ shape
- Each side is equal/not equal in length

Activity Sheet 12

Purses to £2

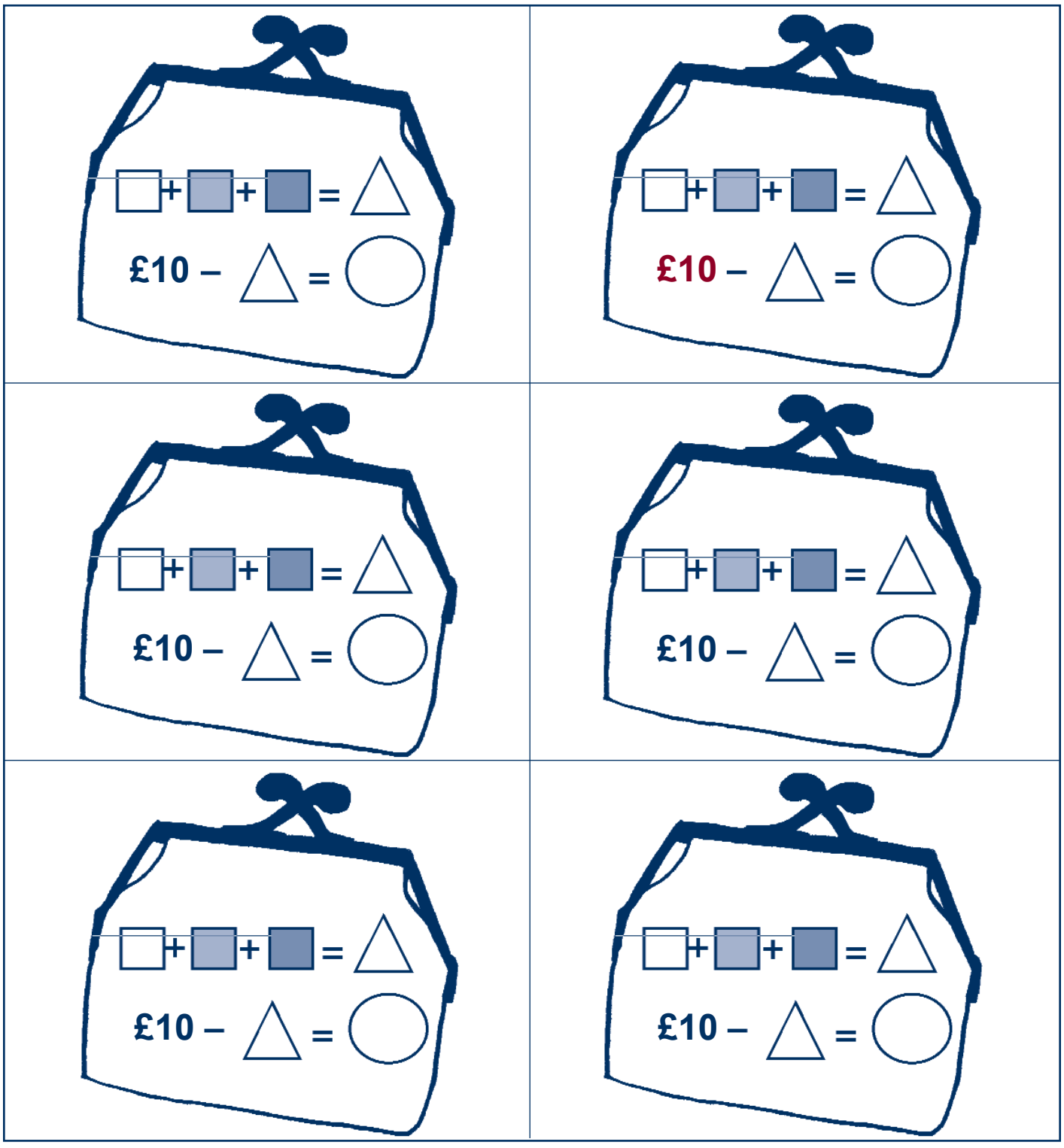
Name _____



Activity Sheet 13.1

Purses to £10

Name _____



Activity Sheet 13.2

Coins in a line

Resources

two spinners (from Activity Sheet 13.3)
counters in two different colours

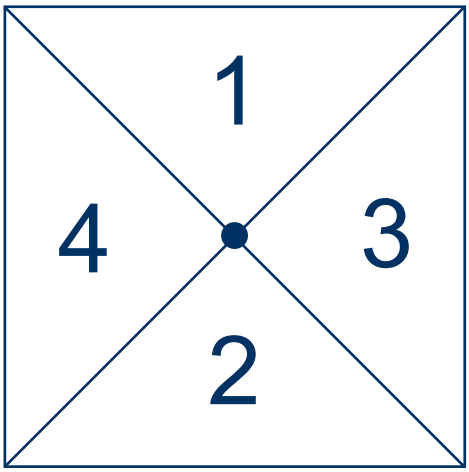
Rules

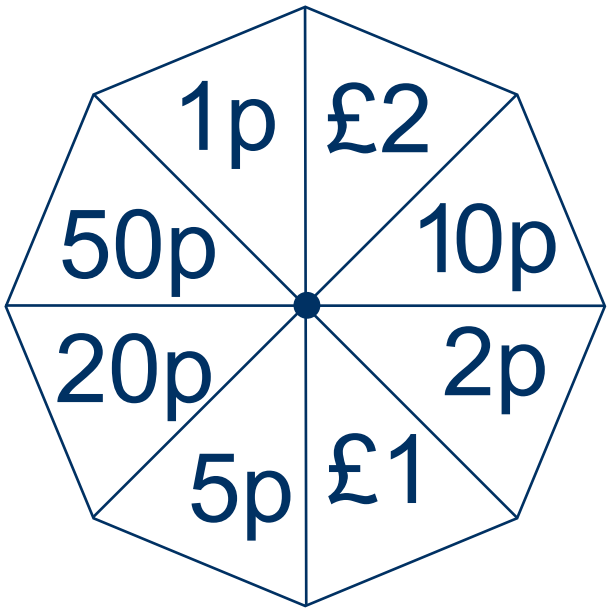
This is a game for two players. Each player takes turns to spin the two spinners. Multiply the coin value by the number to get a total. Cover that amount on the game board with a counter. If the amount has already been covered, you can use the 'star' boxes as 'wild cards'. The first to connect the amounts from one side of the board to the other wins. If there is not time to cross the entire board, the winner is the one with the most connections made.

1p	50	*	20p	10p	40p
15p	60p	£1.50	30p	*	3p
8p	*	4p	£2	10	£1
2p	40p	20p	*	£	50p
£2	6	*	2p	5p	£3
£1	5p	£6	20p	40p	*
*	8	10p	£4	1p	5p
£2	40p	*	20p	50p	£8
10p	*	20p	3p	4	£1
20p	60p	80	£1	*	6p
50p	2p	8p	*	£2	£8

Activity Sheet 13.3

Spinners for Coins in a line





Photocopy these spinners onto card and use a spent matchstick to push through the middle.

Activity Sheet 13.4

Money loop game (1)

You have £22.50 I have two 20p coins and one 10p coin	You have 50p I have a £2 coin and four 20p coins	You have £2.80 I have a 5p coin, a 10p coin and a 50p coin
You have 65p I have three £1 coins, a 50p coin, a 10p coin and a 2p coin	You have £3.62 I have three 50p coins	You have £1.50 I had £5 and spent £2.40
You have £2.60 I had £7.50 and spent £1.99	You have £5.51 I had £2.35 and spent £1.22	You have £1.13 I had four lots of £1.50 for my birthday

Activity Sheet 13.4 continued

Money loop game (2)

You have £6 I bought four packs of sweets at 60p each	You spent £2.40 I paid 15p for each of five chocolate bars	You paid 75p I got 34p change from £2
You spent £1.66 It cost me 80p for each child to go swimming. How many did I take in for £3?	You took 3 children It cost me £1.50 to take each child to the cinema. How many did I take for £8?	You took 5 children How many pence do I have if I have £1.57?
You have 157 pence How many pence do I have if I have £8.50?	You have 850 pence How many pence do I have if I have £7.75?	You have 775 pence I have 356 pence. How much have I got in pounds and pence?

Activity Sheet 13.4 continued

Money loop game (3)

You have £3.56 I have 970 pence. How much have I got in pounds and pence?	You have £9.70 I have 103 pence. How much have I got in pounds and pence?	You have £1.03 How many 10p coins would you give me to make £3?
I would give you 30 How many 20p coins would you give me to make £3?	I would give you 15 How many 2p coins would you give me to make £2?	I would give you 100 How many 5p coins would you give me to make £2?
I would give you 40 I bought a cuddly toy for £1.30 and a book for 90p. How much did I pay altogether?	You paid £2.20 I bought a pen for 80p and a pair of roller blades for £5.90. How much did I pay altogether?	You paid £6.70 I bought a magazine for 45p and a CD for £3.99. How much did I pay altogether?

Activity Sheet 13.4 continued

Money loop game (4)

You paid £4.44 _____ I save 75p a week for three weeks. How much do I have altogether?	You have £2.25 _____ I save £1.20 a week for five weeks. How much do I have altogether?	You have £6 _____ I save £2.25 a week for ten weeks. How much do I have altogether?

Activity Sheet 14

Number lines

Name _____