Marking guidance

↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	**FDRP** **Identify the value of each digit in numbers** with up to **3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers to up to 3 decimal places;** use this knowledge to compare and order numbers, and round numbers, with up to 3 decimal places.	0·38	1	The combination of the two operations (multiplication and division) results in a variety of incorrect answers, e.g. 3·8, 38, 380.	A good strategy is to jot down the answer to the first part before moving to the second part, i.e. 3·8 × 100 = 380; 380 ÷ 1000 = 0·38. Children still confused about multiplying and dividing by 10, 100 and 1000 need to write numbers on a place-value grid to see the effect of doing this in terms of direction and number of digit shifts.

2*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	**FDRP** **Identify the value of each digit in numbers** with up to **3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers to up to 3 decimal places;** use this knowledge to compare and order numbers, and round numbers, with up to 3 decimal places.	590	1	Similar difficulties to question 1 occur. Possible errors are 59 and 5900.	See advice for question 1.
3*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method to add whole numbers with up to 5 digits.	53 973	1	Errors involving exchanging are the most common – an answer of 53 863 or 73 863 would suggest that this has happened. Some arithmetical errors in this and the following addition questions may be due to children rushing rather than not knowing basic addition bonds.	Make sure children are marking down digits for exchanging in the correct place. If necessary use the expanded method of recording.

4	↓ **Y5.NF.10** Solve problems involving numbers up to three decimal places	**AS** Choose and use an appropriate mental or written method, including column addition and subtraction, to add and subtract decimal numbers with 1, 2 or 3 decimal places, including in the context of measures and money.	42·73	1	This question involves exchanging between each successive column, so check that this hasn't caused problems – particularly when exchanging across the decimal point.	A good strategy is to put a decimal point in the answer line before doing the calculation, which then allows the calculation to be done in the same way as a whole number column addition.
5	↓ **Y5.NF.10** Solve problems involving numbers up to three decimal places	**AS** Choose and use an appropriate mental or written method, including column addition and subtraction, to add and subtract decimal numbers with 1, 2 or 3 decimal places, including in the context of measures and money.	31·95	1	Here children need to rewrite the addition as a column addition, so errors can occur where the digits are not aligned correctly.	Children can use column headings (10s, 1s, 0·1s and 0·01s) to help align digits correctly.

6	**Y6.ASMD.6** Use their knowledge of the order of operations to carry out calculations involving the four operations	**MD** **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	8	1	An answer of 7 may indicate a child has simply divided 42 by 6 and then not followed through with the second step. Other errors include using incorrect multiplication and division facts, giving answers such as 6 and 9.	Remind children to check their answer by showing the separate calculations, e.g. 56 ÷ 8 = 7; 7 × 6 = 42. Multiplication facts and corresponding division facts have to be practised regularly even where children have learnt them in earlier years.
7	**Y6.ASMD.6** Use their knowledge of the order of operations to carry out calculations involving the four operations	**MD** **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	6	1	An answer of 216 would suggest a child has multiplied 36 (from 4 × 9) by 6 rather than dividing it. Other errors, e.g. 5 or 7, may suggest wrongly recalled multiplication facts.	See advice for question 6.
8*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method to subtract whole numbers with up to 5 digits.	16 634	1	The question involves multiple exchanges, which may be tricky for some. An answer of 23 446 suggests a child has simply taken the smaller from the larger digit in each column.	If children are really confused with multi-digit column subtractions, practise using the expanded method or practise examples using fewer digits or fewer exchanges.

9	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate mental or written method, including column addition and subtraction, to add and subtract decimal numbers with 1, 2 or 3 decimal places, including in the context of measures and money.	215·43	1	Exchanging across the decimal point can confuse some children, as can exchanging through multiple columns.	As with decimal column addition, putting the decimal point in the answer line before starting the calculation can help.
10*	**Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits** by numbers between 10 and 40 **using the formal written method of long multiplication.**	50 688	1	An answer of 28 160 suggests that the place value aspect of multiplying by 10 has been ignored. Other errors may be due to mistakes in recalling 8 times-table facts or rushing and not checking the final addition part.	Encourage children to estimate. An approximate answer of 50 000 (2500 × 20) should alert children to the fact that 28 160 cannot be correct.
			Total	**10**		

Marking guidance

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Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	↓ **Y5.NPV.1** Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	**NPV** **Read, write, order and compare numbers up to 1 000 000 and determine the value of each digit.**	b) seven hundred thousand and thirty c) seven hundred and seventy thousand and three d) seven hundred and two thousand, three hundred and twenty e) three hundred and seven thousand, seven hundred	2	Multiple occurrences of the same digit in a large number – as in 770 003 and 702 320 – as well as the positioning of zeroes, can cause confusion with reading and writing large numbers.	Write large numbers on place-value grids so children can refer to the place-value headings when reading large numbers. Insist they are read as proper numbers and not as a digit string (as with a phone number, for example).

2*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	**FDRP** **Identify the value of each digit in numbers with up to 3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers to up to 3 decimal places;** use this knowledge to compare and order numbers, and round numbers, with up to 3 decimal places.	2·86, 2·681, 2·618, 2·6	2	When the unit digit is the same in a set of decimal numbers as here, some children treat the digits after the decimal point as whole numbers (i.e. 86, 681, 618 and 6), and order the decimal numbers according to these 'whole' numbers to give 2·681, 2·618, 2·86, 2.6.	A good strategy is to equalise the number of digits after the decimal point using zeroes, e.g. 2·618, 2·860, 2·600, 2·681, then to compare numbers by looking at successive places, 1s, 0·1s, 0·01s in order to determine the correct order.

3*	↓ **Y5.NF.7** Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents **Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places **Y6.NF.10** Solve problems which require answers to be rounded to specified degrees of accuracy	**FDRP** a) Convert decimals (up to 3 places) to fractions and vice versa using thousandths, hundredths and tenths. b) **Identify the value of each digit in numbers with up to 3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers to up to 3 decimal places;** use this knowledge to compare and order numbers, and round numbers, with up to 3 decimal places.	a) 0·607, 0·035 b) 72·4, 0·7	2	For part (a) 6·07 and 0·35 are possible errors. For part (b) 72 and 0·73 are possible errors.	A decimal place-value grid can be used to help children see the decimal equivalents of these fractions. Use a number line marked in tenths to place the numbers. Ask questions such as: *Is 72·36 closer to 72·3 or 72·4? Is 0·728 closer to 0·7 or 0·8?*

4*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method to add whole numbers with up to 5 digits.	8227	2	Answers such as 8127 or 7127 suggest place-value errors. Less likely are incorrect answers caused by mistakes with simple addition.	Write column headings above the numbers and encourage children to set them out with enough space for exchanging numbers. If necessary, practise using the expanded method. Where children are making arithmetical errors, they need to be reminded to check by repeating their calculations.
5	↓ **Y5.NF.10** Solve problems involving numbers up to three decimal places	**AS** Choose and use an appropriate mental or written method, including column addition and subtraction, to add and subtract decimal numbers with 1, 2 or 3 decimal places, including in the context of measures and money.	a) 6.5 b) 28·5 kg	2	Possible errors for part (a) are 6·7 or 6·6 and for part (b) are 28·6, 28·4 or 27·5. This indicates a mental strategy has not been applied accurately, e.g. adding 1 then adding 0·1 rather than adding 1 and then subtracting 0·1 when adding 0·9.	If children are still struggling with such mental strategies, encourage them to use jottings to reflect their thinking.

6	**Y6.ASMD.7** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**ALG** Use letters to represent missing numbers in number sentences. **AS** **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	a) 9 cm b) 80°	2	For part (a) 18 cm shows a misunderstanding of finding the unknown length. An answer of 5 cm suggests confusion between area and perimeter. For part (b) 100° could be the result of thinking that the angles of a triangle add to 200°.	Children need to focus on what information is given and what remains to be found. In each case two steps are required to solve the problem and, although the arithmetic is quite straightforward, children may need support in identifying and articulating the two steps.
7	**Y6.ASMD.6** Use their knowledge of the order of operations to carry out calculations involving the four operations	**AS** **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	a) ✖ b) ✔ c) ✔ d) ✖	2	In part (a) some children may add the 3 and 9 first and double to get 24. For part (c) some may add 18 to 54 before dividing by 9. For part (d) some may do the subtraction first.	Give children digit cards and cards with each of the operations and brackets. Use these to construct number sentences with a particular target, reminding children of the order of operations.

8*	**Y6.M.2** Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places	**MEA** **Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate**.	a) 4·5 kg or 4 $\frac{1}{2}$ kg b) 3000 g	2	Some children may ignore the instructions regarding the units of the answer and give 4500 for part (a) and 3 for part (b). Others may misread the scale and think it is 4·1 kg or 5·5 kg, which will then impact on the answer to part (b). Some children may add rather than subtract the weight of the oranges, giving an answer of 6000 g.	Errors such as those described suggest children need to read questions more carefully, underlining or circling key information. Where children are unclear about the relationship between kilograms and grams, practise using flashcards with corresponding weights on each side.
9*	**Y6.M.2** Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places	**MEA** **Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate.**	a) 1000 mm b) 1 km	2	Answers of 10 and 100 for part (a) and 100 and 1000 for part (b) are possible errors.	Give children more experience of the relationships between all length measures, not just the common ones (10 mm = 1 cm, 100 cm = 1 m, 1000 m = 1 km).

10	**Y6.M.3** Convert between miles and kilometres	**MEA** Begin to **convert between miles and kilometres.**	64 kilometres	2	An answer of 25 suggests a child has divided by 8 and multiplied by 5 rather than the other way around. Answers such as 53 or 27 suggest children have misunderstood this topic completely and simply added or subtracted 5 and 8 to or from 40.	Practise in a real-life context, e.g. converting distances between towns in the UK from miles to kilometres. Since 5 miles is approximately 8 kilometres, children should realise that the number of kilometres equivalent to a number of miles is always going to be larger.
11	**Y6.M.2** Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places	**MEA** **Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 decimal places.**	a) 17:15, 18:25 b) 1 hour 10 minutes (or 70 minutes)	2	For part (a) 15:15 and 16:25 suggest children have added 10 rather than 12 to the pm times. Some may give the correct numerical answers but still include the pm, which is not needed. For part (b) some may give the answer as 110 minutes or 1 hour 50 minutes.	A good way to avoid all of these errors is to use a timeline from midnight to midnight, i.e. 24 hours. Write both 12-hour and 24-hour times on this so the equivalents can be seen, and calculations across a whole hour can be drawn out.

12*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method to add whole numbers with up to 5 digits.	1656	2	Some children may add rather than subtract and give an answer of 11 438. A variety of place-value errors can occur when using column subtraction and answers such as 2356, 1678, 1658 or 1766 would indicate this.	Practise column subtraction using the expanded method if necessary. Also encourage children to check a subtraction by adding their answer back on.
13	**Y6.ASMD.7** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Choose and use an appropriate mental or written method, including column addition and subtraction, to add and subtract decimal numbers with 1, 2 or 3 decimal places, including in the context of measures and money. **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	£14·50	2	Some children may do only one step of the problem, e.g. subtracting only the adult ticket from £50 to give an answer of £26·50 or adding the two amounts but not subtracting to give an answer of £35·50. An answer of £15·50 would suggest a place-value error in the final subtraction.	Aside from correcting any subtraction errors, encourage children to identify word problems as '1-step' or '2-step' by carefully reading them before doing any calculations.

14	**Y6.ASMD.4** Perform mental calculations, including with mixed operations and large numbers **Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**MD** **Multiply multi-digit numbers up to 4 digits** by numbers between 10 and 40 **using the formal written method of long multiplication.** Use short multiplication to multiply numbers with up to 4 digits, including amounts of money, by 1-digit numbers and solve word problems involving multiplication including two-step problems and finding change.	£2574	2	Answers of £2600 or £2626 suggest that the 26 has been correctly multiplied by 100, but not adjusted or not adjusted correctly. £2501 is the result of subtracting 99 rather than 26 from £2600. An answer of £234 suggests that the 26 has been multiplied by 10, not 100. A range of arithmetical or place-value errors may occur if children try to solve this using long multiplication.	Encourage children to find the easier method, in this case multiplying by 100, and how that can be used to help find the answer, in this case adjusting by subtracting 26 to find the cost. Discuss how much easier that is than performing a long multiplication.
15*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**MD** Use short multiplication to multiply numbers with up to 4 digits, including amounts of money, by 1-digit numbers and solve word problems involving multiplication including two-step problems and finding change.	9102	2	Errors may be the result of mistakes in layout, particularly exchanging between columns. There could also be arithmetical mistakes in the recall of 6 times-table facts.	Encourage children to estimate – in this case 1500 × 6 gives 9000. Children who are confused with the layout could practise using the grid method and, when confident, look again at short multiplication.
			Total	**30**		

Marking guidance

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Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	↓ **Y5.NF.4** Add and subtract fractions with the same denominator and denominators that are multiples of the same number	**FDRP** Use equivalence to add and subtract proper fractions and mixed numbers with related or unrelated denominators, and spot and test a rule. Convert improper fractions to mixed numbers; convert mixed numbers to improper fractions.	$\frac{10}{9}$ simplified to $1\frac{1}{9}$ Award $\frac{1}{2}$ mark if the answer is left as an improper fraction.	1	An answer of $\frac{10}{18}$ suggests a child has added the denominators as well as the numerators. Check that children understand how to simplify the improper fraction.	Look at a similar calculation using a visual model, e.g. a number line split into ninths.
2*	↓ **Y5.NF.4** Add and subtract fractions with the same denominator and denominators that are multiples of the same number	**FDRP** Use equivalence to add and subtract proper fractions and mixed numbers with related or unrelated denominators, and spot and test a rule. Convert improper fractions to mixed numbers; convert mixed numbers to improper fractions.	$\frac{21}{10}$ simplified to $2\frac{1}{10}$ Award $\frac{1}{2}$ mark if the answer is left as an improper fraction.	1	An answer of $\frac{21}{30}$ suggests a child has added the denominators as well as the numerators. Check that children understand how to simplify the improper fraction.	As above.

3*	**Y6.ASMD.4** Perform mental calculations, including with mixed operations and large numbers	**FDRP** Find non-unit fractions of amounts.	52	1	An answer of 26 suggests that a child has found $\frac{1}{3}$ of 78 but not multiplied by 2 to find $\frac{2}{3}$. Watch for other numerical errors that suggest mistakes in mental maths.	Remind children of the method for finding a fractional amount – dividing by the denominator and multiplying by the numerator. Only when the fractions are unit fractions do we divide by the denominator only.
4*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** **Divide numbers up to 4 digits** by numbers up to 12 **using the formal written method of short division where appropriate, interpreting remainders according to the context** and using reasoning to find a solution.	129	1	Errors occur when children do not exchange between the digits as they are dividing, e.g. 109, which suggests that the child has divided 6 by 5 then 45 by 5.	Remind children to think about what each digit represents. The '6' is 600 so, although 5 goes into 6 once, there is still 100 left over. This is written next to the 4 in the the next place, so the next division is 5 into 140.
5*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** **Divide numbers up to 4 digits** by numbers up to 12 **using the formal written method of short division, where appropriate interpret remainders according to the context** and use reasoning to find a solution.	1683	1	As above, errors occur when children do not exchange correctly between the digits as they are dividing, giving an answer such as 1108.	As above.

6*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** **Divide numbers up to 4 digits** by numbers up to 12 **using the formal written method of short division, where appropriate interpret remainders according to the context** and use reasoning to find a solution.	44 r 7 or $44\frac{7}{8}$	1	As well as the types of errors suggested in questions 4 and 5, watch for mistakes in setting out the question. Some may ignore the remainder completely, just giving the answer 44 (or even 45); no marks can be given for this.	Division is a more complicated operation because it doesn't always give an exact whole answer. If children are confused about remainders then look at them again using smaller numbers that can be physically modelled, e.g. 23 ÷ 5.
7	**Y6.NF.3** Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	**FDRP** Use equivalence to add and subtract proper fractions and mixed numbers with related or unrelated denominators, and spot and test a rule.	$\frac{5}{10}$ simplified to $\frac{1}{2}$ Award $\frac{1}{2}$ mark if the answer is not simplified.	1	An answer of $\frac{7}{5}$ suggests a child has simply subtracted the numerators and denominators.	Children need to be reminded that, when denominators of fractions are different, one or both fractions need to be changed to an equivalent with the same denominator. Use of visual models, such as a fraction wall, can help children with this process.

8*	**Y6.RP.2** Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison	**FDRP** Use knowledge of equivalence between fractions and percentages and mental strategies to solve problems involving the calculation of percentages, including amounts of money and other measures.	80	1	Watch for children who attempt another calculation with 25 and 320, e.g. subtraction, giving 295. Other numerical errors occur where a child has realised that 25% is $\frac{1}{4}$ but has then made an error with the division.	In order to find a percentage amount, children should first convert the percentage to a fraction before operating on the number. Children may need to practise recognising fraction and percentage equivalents, e.g. by marking each along a number line.
9	↓ **Y5.NF.5** Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**FDRP** Multiply fractions less than 1 by whole numbers.	$\frac{15}{4}$ simplified to $3\frac{3}{4}$ Award $\frac{1}{2}$ mark if the answer is left as an improper fraction.	1	Answers of $5\frac{3}{4}$ or $\frac{8}{4}$ suggest a child has tried to do an addition rather than a multiplication. An answer of $\frac{15}{20}$ suggests a child has multiplied both the numerator and the denominator by 5.	If a child is not following the method for multiplying fractions then revise using a visual model such as shapes divided into quarters.
10	**Y6.NF.5** Divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]	**FDRP** **Divide proper fractions by whole numbers.**	$\frac{1}{12}$	1	Answers of $3\frac{1}{4}$ or $\frac{3}{4}$ suggest a child has added or multiplied rather than divided.	As for question 9, revise with a visual model, in this case a quarter of a shape divided into three pieces.
			Total	**10**		

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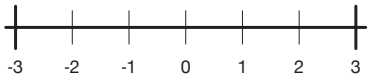
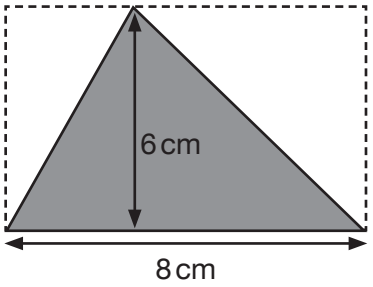
Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1	**Y6.NPV.3** Use negative numbers in context, and calculate intervals across zero	**NPV** **Use negative numbers in context, and calculate intervals across zero** and give generalisations to describe what happens when adding and subtracting with positive and negative numbers.	–2·2, –2, –1·2, 2, 2·1	2	The digit 2 appears in every number as a negative or positive and in the 1s or 0·1s place, which can cause difficulties, as can the mix of negative numbers and decimals.	Advise children to use a number line, initially labelled only with integers above the line. These act as markers for other numbers, for example:  From left to right, the five numbers to be ordered can then be positioned approximately below the line, for example: 

2	**Y6.NPV.3** Use negative numbers in context, and calculate intervals across zero	**NPV** **Use negative numbers in context, and calculate intervals across zero** and give generalisations to describe what happens when adding and subtracting with positive and negative numbers.	a) 10·5°C b) 6°C	2	a) 5·5°C as an answer suggests children are counting on from –4 in 1s rather than 2s. b) Since both temperatures are negative, a possible error is –6°C.	a) When looking at any kind of scale, children need to be reminded to look at the intervals rather than simply count along the spaces. b) On a –10 to 10 number line, look for pairs of numbers that have a difference of 6. This could be 2 and 8, –2 and 4 or –7 and –1; the difference is in each case the same.
3	**Y6.NF.2** Compare and order fractions, including fractions > 1	**FDRP** **Compare and order fractions, including fractions > 1.**	a) $\frac{2}{3}$ and $\frac{6}{9}$ b) $\frac{5}{6}$	2	a) Some may circle $\frac{3}{6}$ and $\frac{5}{6}$ or $\frac{4}{9}$ and $\frac{6}{9}$, each pair having the same denominator. b) Some may give $\frac{6}{9}$ as an answer as it has the largest digits.	Children need to be reminded to take account of the relationship between the numerator and denominator in determining equivalence or the relative size when comparing fractions.

4*	**Y6.NF.2** Compare and order fractions, including fractions > 1	**FDRP** Convert improper fractions to mixed numbers; convert mixed numbers to improper fractions. **Compare and order fractions, including fractions > 1.**	a) ✖ b) ✔ c) ✔ d) ✖	2	It is likely that a child not grasping this concept will just make random guesses. Check the child's method for converting between mixed numbers and improper fractions if you suspect that is the case.	Remind children that, when converting, each whole number 'contains' the number of parts of the fraction. Multiplying the whole number by the denominator of the fraction and adding the extra fraction part converts a mixed number to an improper fraction; reversing the process changes an improper fraction into a mixed number.
5	**Y6.M.5** Recognise when it is possible to use formulae for area and volume of shapes	**MEA** **Recognise that shapes with the same areas can have different perimeters and vice versa;** begin to measure area and perimeter.	a) 30 cm b) 54 cm^2	2	Take half a mark off in each case if the numerical answer is correct but children have not used the correct units (or not given any at all). If a child has reversed the answers, giving 54 cm for perimeter and 30 cm^2 for area, then no marks can be given. An answer of 15 cm for perimeter suggests a child has only added the given length and width of the rectangle, and not the unmarked sides.	Investigate the relationship between area and perimeter of a rectangle, e.g. what different rectangles could have a perimeter of 30 cm? What is the area in each case? Activities such as this should reinforce which is which.

6	**Y6.M.6** Calculate the area of parallelograms and triangles	**MEA** **Calculate the area of parallelograms and triangles.**	Petra is correct because 12(*b*) × 7(*h*) is 84, and half of this is 42.	2	No marks can be given unless a child has attempted an explanation. The explanation should make reference to the formula for area of a triangle, and specifically note that Bobby has only multiplied the height by the base without then halving it (or dividing by 2).	Show children the following diagram and remind them that the formula for the area of a triangle derives from seeing a triangle drawn inside a rectangle: 
7	**Y6.M.7** Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3) **Y6.GPS.2** Recognise, describe and build simple 3D shapes, including making nets	**MEA** **Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units (for example, mm^3 and km^3).** **GEO** **Recognise, describe and build simple 3D shapes, including making nets.**	a) 125 cm^3 b) 1st and 3rd	2	a) Some may give an answer of 25 cm^3 (squaring rather than cubing the 5 cm). Other answers, such as 120 cm^3 or 100 cm^3, suggest errors in calculating 25 × 5. b) Some children miss the first of these and incorrectly think that the second can make a cube	a) Remind children that since a cube is 3-dimensional, volume is the result of multiplying three numbers together – compare this to area, which is 2-dimensional. b) A good strategy is to mark a cross on one square to demarcate the base of the cube, then to consider how the other faces fold around that.

8	**Y6.ASMD.4** Perform mental calculations, including with mixed operations and large numbers	**AS** **Use knowledge of the order of operations** and brackets **to carry out** multi-step **calculations involving** addition, subtraction, multiplication and division.	a) 30 b) 225	2	Watch out for children who only complete the first part of the calculation in each instance, giving 60 for part (a) and 450 for part (b). Some errors may also occur when dividing by 2 in part (b), resulting in answers such as 200 or 220.	When children are doing a two-part calculation they should always be encouraged to jot down the answer to the first part.
9*	**Y6.ASMD.4** Perform mental calculations, including with mixed operations and large numbers	**FDRP** Find non-unit fractions of amounts.	Yes, Tariq is right because 36 > 30.	2	No marks can be given unless a child has attempted to give an explanation, showing evidence that the fractional amounts have been calculated in each case, giving 36 for $\frac{3}{4}$ of 48 and 30 for $\frac{2}{5}$ of 75. Some children may think that Tariq is wrong if they only work out the unit fraction amount, since $\frac{1}{4}$ of 48 is 12 and $\frac{1}{5}$ of 75 is 15.	Remind children of the method for finding a fractional amount – dividing by the denominator and multiplying by the numerator. Only when the fractions are unit fractions do we divide by the denominator only.

10*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** **Divide numbers up to 4 digits** by numbers up to 12 **using the formal written method of short division where appropriate, interpreting remainders according to the context** and using reasoning to find a solution.	£134·25	2	An answer of 134 r1 shows a lack of understanding of interpreting a remainder in the context of a word problem. Award 1 mark in this instance, where a child has done the division correctly but not interpreted the remainder correctly. Other numerical errors may occur if a child is not carrying out short division correctly – check how they have answered questions 4–6 in the Arithmetic test.	When dividing amounts in the context of word problems, children need to think about the significance of the remainder. In this problem it represents £1, and sharing that between four gives 25p each, so the remainder should be written as a decimal fraction to show the amount in pence.
11	**Y6.NF.3** Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	**FDRP** Use equivalence to add and subtract proper fractions and mixed numbers with related or unrelated denominators, and spot and test a rule.	a) $\frac{7}{8}$ b) $\frac{1}{8}$	2	An answer of $\frac{4}{10}$ for part (a) and $\frac{2}{6}$ for part (b) suggests that a child has simply added or subtracted the numerators and denominators of the fractions.	Children need to be reminded that, when denominators of fractions are different, one or both fractions need to be changed to an equivalent with the same denominator. Use of visual models, such as a fraction wall, can help children with this process.

12	**Y6.NF.11** Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	**FDRP** Use knowledge of equivalence between fractions and percentages and mental strategies to solve problems involving the calculation of percentages, including amounts of money and other measures.	$\frac{3}{5} = 60\%$ $\frac{3}{4} = 75\%$ $\frac{3}{10} = 30\%$ $\frac{3}{100} = 3\%$	2	Some children may mix up $\frac{3}{10}$ and $\frac{3}{100}$, linking them to 30% and 3% respectively. Children not knowing the equivalents may simply give random answers.	Some children find it helpful to write each fraction equivalent with a denominator of 100, making it easier to change to a percentage, i.e. $\frac{3}{5}$ as $\frac{60}{100}$, $\frac{3}{4}$ as $\frac{75}{100}$ and $\frac{3}{10}$ as $\frac{30}{100}$ respectively.
13	**Y6.RP.2** Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison	**FDRP** Use knowledge of equivalence between fractions and percentages and mental strategies to solve problems involving the calculation of percentages, including amounts of money and other measures.	18 kg	2	A possible error is 6 kg, the result of children not fully reading the question part of the word problem. 6 kg is 25% of 24 kg; this is the weight thrown away, not the weight that is left, so no marks can be awarded. One mark can be awarded for the correct method, even if a numerical error has been made, where there is evidence that children have calculated 25% of 24 kg and then subtracted that answer from 24.	Advise children, after reading the whole question and picturing the events, to circle the important words in the problem, including those that may already be in bold.

14	↓ **Y5.NF.5** Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**FDRP** Multiply fractions less than 1 by whole numbers.	$\frac{12}{5}$ or $2\frac{2}{5}$	2	Answers of $4\frac{3}{5}$ or $\frac{7}{5}$ suggest a child has attempted some kind of addition rather than multiplication. An answer of $\frac{12}{20}$ suggests a child has multiplied both the numerator and the denominator of the fraction.	Encourage children to draw a diagram, e.g. a drawing of four circles (pizzas) each cut into five slices with three of the slices shaded represents the problem and makes it clear what calculation needs to be carried out.
15	**Y6.NF.5** Divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]	**FDRP** **Divide proper fractions by whole numbers.**	$\frac{1}{6}$	2	Answers of $3\frac{1}{2}$ or $\frac{3}{2}$ suggest that a child has attempted addition or multiplication rather than division.	As with question 14 a diagram will help. In this case, half a bottle split into three sections to represent dividing by 3, so that each child gets $\frac{1}{6}$ of the bottle.
			Total	**30**		

Marking guidance

↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method to subtract whole numbers with up to 7 digits.	25 574	1	An answer of 34 586 is the result of simply giving the difference between digits in each column.	If decomposition hasn't been understood, it should be revised using 3- and 4-digit numbers with an expanded notation.
2	**Y6.NF.4** Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]	**FDRP** Multiply pairs of unit fractions by reading the × sign as 'of'.	a) $\frac{1}{18}$ b) $\frac{1}{35}$	1	Answers of $\frac{2}{9}$ and $\frac{2}{12}$ suggest children have added the numerators and denominators.	When multiplying fractions, the numerators and denominators are multiplied together. However, children often fail to follow this rule. Encourage use of a visual model using 'of' as a reading of the multiplication symbol. For example, for part (a): *There is a sixth of a cake left. What fraction of the whole cake would one third of that be?*

3	**Y6.NF.4** Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]	**FDRP** Multiply unit fractions by non-unit fractions, writing the answer in its simplest form.	a) $\frac{5}{24}$ b) $\frac{2}{15}$	1	Answers of $\frac{5}{10}$ and $\frac{3}{15}$ suggest children have added the numerators and denominators.	As above, illustrate questions with a visual model.
4*	**Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits by a** 1- or **2-digit whole number using the formal written method of long multiplication.**	1984	2	An answer of 868 suggests a place-value error when multiplying by the 10. Other errors may be due to problems with the long multiplication layout. Some children may use the grid method, which is perfectly acceptable.	Encourage children to estimate before carrying out the calculation – this should alert to a place-value error. Model carefully using the correct layout. $\begin{array}{rcccc} & & 1 & 2 & 4 \\ \times & & & 1 & 6 \\ \hline & 1 & 2 & 4 & 0 \\ & & 7^{1} & 4^{2} & 4 \\ \hline & 1 & 9 & 8 & 4 \end{array}$
5*	**Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits by a** 1- or **2-digit whole number using the formal written method of long multiplication.**	74 681	2	An answer of 16 235 suggests a place-value error when multiplying by the 20. Other errors may be due to problems with the long multiplication layout.	See question 4 above.

6*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method, including column addition, to add whole numbers with up to 7 digits, and identify patterns in the number of steps required to generate palindromic numbers.	4 156 117	1	Errors will most likely be due to incorrect exchanging between columns.	Practise adding 3- and 4-digit numbers, using expanded notation to illustrate the importance of the exchanging digits.
7*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method, including column addition, to add whole numbers with up to 7 digits, and identify patterns in the number of steps required to generate palindromic numbers.	7 981 493	1	An answer of 11 337 629 suggests that the digits have been misaligned when writing the numbers in columns. Other errors are possible, due to incorrect exchanging when adding, as with question 6.	See question 6 above. Children misaligning digits when writing the numbers in columns may find it helpful to write place-value headings.

8*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method to subtract whole numbers with up to 7 digits.	3 977 610	1	An answer of 264 246 suggests that the digits have been misaligned when writing down the numbers in columns. Other errors may be due to misunderstanding decomposition.	Children who misalign digits when writing the numbers in columns may find it helpful to write place-value headings. If decomposition hasn't been understood then, as with question 1, this should be revised using 3- and 4-digit numbers with an expanded notation.
9*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** Use short division to divide 4-digit numbers by 1-digit numbers, including those which leave a remainder; spot patterns, make and test general rules, and check when an answer does not fit the predicted pattern.	324 r 2 or $324\frac{2}{6}$	1	Some children may just give the answer 324, ignoring the remainder. Other errors may occur if children are not confident with short division.	Model carefully using the correct layout. $\begin{array}{r} 1\ 7\ 4\ 9 \\ 3\ \overline{)\ 5\ {}^{2}2\ {}^{1}4\ {}^{2}7} \end{array}$ Check children's understanding of remainders using smaller numbers, e.g. 44 ÷ 8. *What is the answer? How many different ways could you write the remainder?*

10	**Y6.ASMD.2** Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context	**MD** **Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division,** making an estimate using multiples of 10 or 100 of the divisor, **and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.**	312	2	Most errors here will be due to misunderstanding the long division method. If this has been followed correctly, but an arithmetical error has been made, then 1 mark can be given.	As with all larger number calculations, encourage children to estimate first. If children are making mistakes with the layout, model carefully using the correct layout. $472 \div 13 = 36\frac{4}{13}$
			Total	**13**		

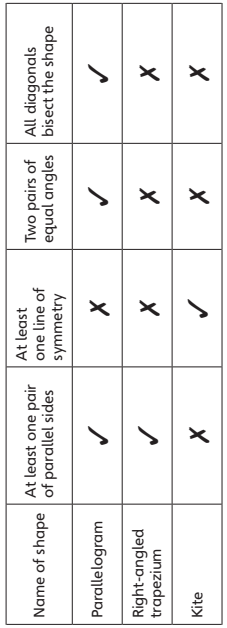
Marking guidance

↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.NPV.1** Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit	**NPV** **Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.**	a) 6 472 621 b) 506 239 c) 4 300 076 d) 7 000 701	2	Watch for children who insert extra 0s, e.g. giving 5 006 239 for (b), or too few 0s, e.g. 4 300 76 for (c).	Encourage children to group digits in threes with a small gap between millions and thousands and between thousands and hundreds. Practise writing numbers on a grid with place-value headings.
2*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method to subtract whole numbers with up to 7 digits.	18 937	2	An answer of 23 747 is the result of adding rather than subtracting. An answer of 1143 suggests that the numbers have been lined up correctly but the difference in value between digits in each column has been given. Other errors occur when digits have not been aligned correctly in columns.	If children are adding in error, revise identifying the key vocabulary in word problems. If decomposition hasn't been understood, it should be revised using 3- and 4-digit numbers with an expanded notation. Children who are not aligning digits correctly could be encouraged to use place-value headings.

3	**Y6.NMD.4** Perform mental calculations, including with mixed operations and large numbers **Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	**MD** Use appropriate strategies to multiply and divide mentally, including by multiples of 10, 100 and 1000.	a) 1500 b) 39 300	2	a) Answers such as 15 000 or 150 suggest that children are shifting the wrong number of digits when dividing. Other errors are possible if a child has multiplied or added instead of dividing. b) An answer of 3·93 or 39·3 suggest that a child has misread the question and divided rather than multiplied, i.e. used the inverse operation.	a) Practise using a place-value grid. b) Model how to jot down such problems using *n* for the unknown number, i.e. *n* ÷ 10 ÷ 10 = 393. The opposite operations must then be carried out to find the original number, i.e. 393 × 10 × 10.
4*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	**FDRP** Compare and order numbers with 1, 2 or 3 decimal places.	Various	2	Errors may occur where the missing number given is larger than the final number if children are not confident ordering decimals, particularly when there are differing numbers of decimal places.	Encourage children to use a number line jotting, with the first and last number at either end. Sometimes it is useful to write the numbers with the same number of decimal places, e.g. 2·54 and 2·60 for part (a), or extra decimal places, e.g. 4·030 and 4·040 for part (d).

5	**Y6.NF.6** Associate a fraction with division and calculate decimal fraction equivalents [for example, 0·375] for a simple fraction [for example, $\frac{3}{8}$]	**FDRP** Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts, and use mental strategies to solve problems involving simple percentages of amounts.	a) ✖ b) ✔ c) ✖ d) ✔	2	Ask children making two or more errors with these questions to explain their thinking to clarify where their misunderstanding lies.	Improve understanding of fraction and decimal equivalents by placing them on a number line and thinking where each fits. This should help clarify that $\frac{7}{10}$ does not equal 0·07, for example. Equivalents of common fractions, i.e. quarters, fifths, tenths should be learnt by heart. This could be practised using double-sided flashcards.
6*	**Y6.NF.8** Multiply one-digit numbers with up to two decimal places by whole numbers	**FDRP** **Multiply 1-digit numbers with up to 2 decimal places by whole numbers.**	The square has the longest perimeter at 31·28 cm. The hexagon has a perimeter of 31·08 cm.	2	Marks should only be given if there is evidence of appropriate short multiplication, giving the perimeter of the square as 31·28 cm and of the hexagon as 31·08 cm. Where there is evidence of appropriate multiplication, but with errors, 1 mark can be awarded. Watch for errors due to misplacing the decimal point in the answer line.	If children find short multiplication with decimals tricky, then the initial decimal numbers can be multiplied by 100 before multiplying by the 1-digit number, and then the answer divided by 100.

7*	**Y6.NF.8** Multiply one-digit numbers with up to two decimal places by whole numbers	**FDRP** **Multiply 1-digit numbers with up to 2 decimal places by whole numbers.**	£185·15	2	Answers of £1851·5 or £18·515 show errors in placing the decimal point after multiplication. Other errors may be due to incorrect recall of 7 times-table facts.	See question 6 above. Encourage children to estimate before calculating with any problems involving money.
8	**Y6.GPS.3** Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons	**GEO** **Compare and classify geometric shapes based on their properties and sizes and** use mathematical reasoning **to find unknown angles in any triangles, quadrilaterals and regular polygons.**		3	Award 1 mark per shape if children have correctly identified all four properties as true or false, and $\frac{1}{2}$ mark if 2 or 3 properties have been identified correctly. Common errors include attributing a line of symmetry to a parallelogram, thinking that a trapezium has a line of symmetry and thinking that both the diagonals of a kite bisect the shape, when in fact only one of them does.	Practise measuring, drawing, cutting out and folding the shapes to establish which shapes have which properties. The technical language involved – bisect, parallel, symmetrical – can be usefully illustrated with a wall poster. Children can take examples from a maths dictionary.

9	**Y6.GPS.3** Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons	**GEO** **Compare and classify geometric shapes based on their properties and sizes and** use mathematical reasoning to **find unknown angles in any triangles, quadrilaterals and regular polygons.**	a) $x = 77°$, $y = 77°$ b) $v = 40°$, $w = 70°$	2	Answers of 82° for x and y suggest that 26 has been incorrectly subtracted from 180 (giving 164 rather than 154). Other errors may be due to incorrectly halving 154. If two different answers are given for x and y, the key property of an isosceles triangle has been missed. Answers of 55° for each of v and w suggest that a child has not recognised which two angles are equal, possibly because of the orientation of the triangle.	Practise missing-angle problems such as these as a mental and oral starter. Consider the diagram in part (a) and calculate the missing angles, then ask children to think what the missing angles would be if the 26° was 36° or 28° or 31°.

10	**Y6.GPS.4** Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius	**GEO** **Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.**	Radius = 7 cm Diameter = 14 cm	1	Answers should be no more than 0·1 cm more or less than the correct measurements, although there may be some discrepancy as a result of printer settings if test is printed in-house. The most important thing is that children show that they know the diameter is double the radius. Some may mix up the radius and diameter, giving the measurements the wrong way around.	Practise drawing circles, using a compass, given different radii or diameters.

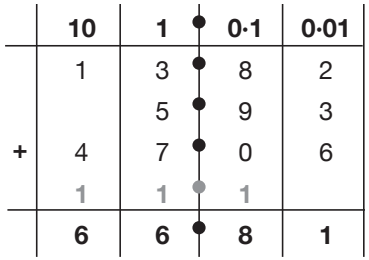
11	**Y6.ASMD.4** Perform mental calculations, including with mixed operations and large numbers	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	a) 1·11 b) 0·28 c) 0·17 d) 0·45	2	Some errors are due to place-value misunderstandings, e.g. 0·93 for part (a) or 0·46 for part (b). Other errors may be arithmetical, e.g. 0·27 for part (c) or 0·55 for part (d).	The place-value errors often occur when children simply look at the digits rather than reading the numbers. Recognising, for example, that in part (a) 0·2 is two tenths makes it clearer that that should be added to the nine tenths of 0·91. Discuss this with the class. Children should also be encouraged to make connections to mental methods with whole numbers, e.g. counting on to get to the next 100 (683 + 17 = 700, 45 + 155 = 200).
12*	↓ **Y5.NAS.1** Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	**AS** Choose and use an appropriate method, including column addition, to add whole numbers with up to 7 digits, and identify patterns in the number of steps required to generate palindromic numbers.	2 913 637	2	The most likely source of errors is when digits have not been aligned correctly. Other errors may be due to incorrectly exchanging between columns when adding large numbers.	Children misaligning digits may benefit from writing out the questions with place-value headings. When working with large numbers, encourage children to estimate and then carefully check answers.

13	**Y6.ASMD.5** Identify common factors, common multiples and prime numbers	**MD** **Identify common factors, common multiples and prime numbers.**	3 matched to 12, 15, 42 4 matched to 4, 12 5 matched to 15 6 matched to 12, 42	2	Some children may match each number to a single multiple rather than all possible multiples. Common errors include: missing 42 as a multiple of 3 as it is beyond the times-table; failing to recognise that any number is a multiple of itself and so missing 4 as a multiple of 4: not recognising 42 as a multiple of 6 (showing a lack of confidence with the 6 times-table).	Check that children understand the difference between factor and multiple. Multiples can always be found by listing out the times-table and then continuing it.
14	**Y6.ASMD.5** Identify common factors, common multiples and prime numbers	**MD** **Identify common factors, common multiples and prime numbers.**	Jane is right. 23 and 29 are the only prime numbers between 20 and 30. Simply answering 'yes', without stating what the two prime numbers are, should not be marked as correct.	2	Marks should be awarded for identifying 23 and 29 as the only prime numbers between 20 and 30. Some children may confuse prime and odd numbers and suggest that there are five prime numbers.	Revise the concept of prime numbers, checking that children know that they can determine if a number is prime by checking that it is not divisible by any number other than 1 and itself.

15*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** Use short division to divide 4-digit numbers by 1-digit numbers, including those which leave a remainder; spot patterns, make and test general rules, and check when an answer does not fit the predicted pattern.	219	2	An answer of 14 016 suggests that a child has multiplied rather than divided. Other errors may be due to mistakes in short division layout or poor recall of 8 times-table facts.	As with all word problems, encourage children to read carefully and identify key information. Encourage children to multiply the result of the division to check their answer.
			Total	**30**		

Marking guidance

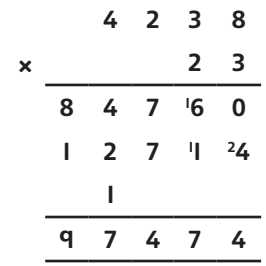
↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	42·73	1	Most errors are likely to be with exchanging; sometimes exchanging across the decimal point confuses children.	Check that children understand the layout of column addition. A good idea is to use column headings and exaggerate the decimal point, e.g. 
2*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	35·91	1	As above. Arithmetical errors may be more likely as there are now three numbers to add.	As above.

3*	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	31·95	1	Errors could be caused by not laying out the calculation properly.	As above. Check children are lining up digits correctly before adding.
4	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	2·64	1	An answer of 3·44 suggests decomposition has not been carried out correctly; sometimes children think they cannot exchange across a decimal point.	A decimal point can be ignored, as long as children remember to re-insert it correctly in the answer line. So the question could be solved as 736 – 472. If necessary, remodel decomposition using the expanded method.

5	**Y6.ASMD.8** Solve problems involving addition, subtraction, multiplication and division	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	10·59	1	An answer of 11·59 suggests a mistake with decomposition. Other errors will occur if numbers are lined up incorrectly in columns.	If using column subtraction, remind children to place numbers so that the decimal points are lined up underneath each other. Alternatively, for this question, a counting up strategy may be easier to understand for some children.

6*	**Y6.NF.8** Multiply one-digit numbers with up to two decimal places by whole numbers
	↓ Y5.NMD.4 Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
		FDRP
		Multiply 1- and 2-**digit numbers with up to 2 decimal places by whole numbers.**
			188·16	1	Check for arithmetic errors due to poor recall of 8 times-table facts. Other errors are likely to be due to mistakes in exchanging digits between columns.	Encourage children to estimate in this and all of the subsequent multiplication and division questions. Review children's understanding of the short multiplication layout, e.g.
						`  1 5·4 8`
						`×       3`
						`  1 1 2`
						`4 6·4 4`

7*	**Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication.**	402·96	2	Most errors are likely to be due to mistakes in layout or misplacing the decimal point in the answer line.	As for question 4, the decimal point can be ignored as long as children remember to place it back correctly into the final answer. So, this question could be solved as 23 × 1752 (40 296), which then has to be divided by 100 to give the correct answer. If necessary, revise the long multiplication layout, e.g. 

8*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** Use short division to divide 4-digit numbers by 1-digit numbers, including those which leave a remainder; spot patterns, make and test general rules, and check when an answer does not fit the predicted pattern.	632 r 3 (or $\frac{3}{8}$)	1	Answers such as 607 or similar, suggest that a child has misunderstood the layout for short division, in particular the exchanging of remainder digits to the next place in a number. Other errors occur with recall of 8 times-table facts. Some children may ignore the remainder, simply giving 623 as the answer.	Revise the layout for short division, e.g. $6\overline{)7^{1}3^{1}7^{5}2}$ $1228\frac{4}{6} = 1228\frac{2}{3}$
9	**Y6.ASMD.2** Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context	**MD** **Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division,** making an estimate using multiples of 10 or 100 of the divisor, **and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.**	124	2	Some children may use a short division strategy for this question and find the layout difficult.	Remind children about estimating. Revise the layout for long division, e.g. $26\overline{)5473}$ 200 + 10, r 13 − 5200 273 − 260 13 $5473 \div 26 = 210\frac{1}{2}$

10	**Y6.ASMD.2** Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context	**MD** **Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division,** making an estimate using multiples of 10 or 100 of the divisor, **and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.**	315 r 9 (or 315 $\frac{9}{26}$)	2	As above.	As above.
			Total	**13**		

Marking guidance

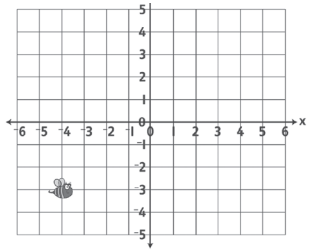
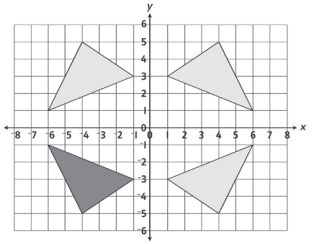
↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.ASMD.7** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	£24·55	2	Possible errors occur if a child has opted to use column arithmetic, e.g. £64·45 suggests an exchanging error when adding the cost of the two items; £35·45 or similar suggests an error with decomposition when subtracting the cost of items from £90. Check answers to Arithmetic test questions 1–5 to see if this is a repeating pattern of errors.	Encourage children to think through what the most appropriate method is. In this question, adding the two costs of the items by mental strategies, e.g. £38·65 + £27, and subtracting 20p, then finding the change by counting up to £90 makes more sense in the context of money.

2*	**Y6.ASMD.7** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	17·86 m	2	An answer of 8·93 m suggests that a child has added only one length to one width. Other errors may be due to mistakes in exchanging digits when adding the lengths. Check Arithmetic test questions 1–3 to see if there are general difficulties in adding decimals.	When doing this calculation using a column method, emphasise the need to have digits lined up correctly and then remember to exchange any digits as they would for whole numbers.
3*	**Y6.ASMD.7** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Choose and use an appropriate method, including counting up, to add and subtract numbers with up to 2 decimal places, including in the context of measures and money and finding change, and use mathematical reasoning to investigate and solve problems.	1·57 m	2	An answer of 8·93 m suggests that a child has added length and width rather than found the difference. An answer of 2·43 m or similar suggests an error with decomposition. Check answers to Arithmetic test questions 4–5 to see if this is a general difficulty and follow advice there.	As with question 1 this problem could be better solved by counting up: count up 0·32 from 3·68 to 4, 1 to 5, then 0·25 to 5·25. Add the jumps, 0·32 + 1 + 0·25 = 1·57.

4	**Y6.S.2** Calculate and interpret the mean as an average	**STA** **Calculate and interpret the mean as an average.**	No. The mean average is 7.	2	Marks can only be given if there is evidence that a child has totalled all the scores and divided 42 by 6, giving the answer 7. One mark can be given if there is evidence that this has been understood as a way to find the mean but the child has made an arithmetic error.	Practise finding mean averages in real-life contexts, e.g. the classroom temperature at five different times during the day, reminding children that the mean is found by adding the total of all of the items and dividing by the number of items, checking carefully for errors in the adding or dividing.
5	**Y6.S.1** Interpret and construct pie charts and line graphs and use these to solve problems	**STA** **Interpret and construct line graphs and use these to solve problems.**	a) Allow 1·3 to 1·4, inclusive b) Allow 7·8 to 8, inclusive	2	Errors such as 1·2 for part (a) and 6·3 for part (b) suggest that a child has incorrectly calculated the value of the divisions on the two axes. Other errors occur when children read axes 'the wrong way around' confusing pounds and kilograms.	Encourage children to write in the values of unmarked divisions on each scale (number line), checking how close to the correct value they are by counting on to the marked divisions.

6	**Y6.S.1** Interpret and construct pie charts and line graphs and use these to solve problems	**STA** **Interpret and construct pie charts and use these to solve problems.**	a) 25 b) Allow 15 to 25, inclusive	2	Answers of 50 for part (a) and less than 10 or more than 30 for part (b) suggest a child is either misunderstanding how the proportions of a pie chart are calculated or is not thinking through the problem clearly.	Check how the child has arrived at their answer. Focus on what the different fractions of the circle represent and how that varies according to how many people are surveyed; this is the most important aspect of a pie chart that children find confusing. In this example, since 200 children were surveyed, the quarter circle choosing 'One Dimension' represents 50 children. If 300 children had been surveyed, the quarter circle would represent 75 children.

7	**Y6.GPD.1** Describe positions on the full coordinate grid (all four quadrants)	**GEO** **Describe positions on the full coordinate grid (all four quadrants).**	a) (–4, –3) b) 	2	The mistake of writing the coordinates of a point in the wrong order often persists and can cause confusion when the coordinates are negative, resulting in (–3, –4) as a common error for part (a). Plotting the point for part (b) at (–1, 5) is also a result of this confusion.	Remind children of ways to remember the correct order for coordinates, for example, 'walk (along the x-axis) before you fly (up the y-axis)'.
8	**Y6.GPD.2** Draw and translate simple shapes on the coordinate plane, and reflect them in the axes	**GEO** **Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.**		3	Award one mark for each of the three triangles in the correct place. Check that the corners of each triangle are correctly at the intersection of the gridlines and penalise if inaccurate. Some children may rotate or translate the triangles rather than reflecting.	Children should be using mirrors to check and inform their drawings. A good strategy is to focus on the positions of each corner of the triangle and its distance from each of the axes, which should be maintained in any reflections.

9	**Y6.GPS.5** Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles	**GEO** **Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.**	$A = 155°$	1	An answer of 165° suggests a mistake in subtracting. An answer of 205° suggests a misunderstanding of what the question is asking.	This question requires knowledge of the sum of angles at a point and an appropriate strategy for calculating a missing angle – in this case adding the two given angles and subtracting from 360°. Support children in thinking through this type of problem: *What do you know? What do you need to find out? What would be a good strategy for solving the problem?*
10	**Y6.GPS.5** Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles	**GEO** **Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.**	$X = 50°$ $Y = 50°$	2	Some children may give 70° for X (subtracting from 200° rather than 180°) and will subsequently make an error with Y.	Support children in thinking through this type of problem, in this case using their knowledge of the sum of angles on a straight line and in a triangle.

11*	**Y6.NMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits by a** 1- or **2-digit whole number using the formal written method of long multiplication.**	9102	2	Errors such as 7202, 9103, 9122 and 10 102 are due to arithmetic and place-value mistakes. Check children's workings to identify the problem. In a test situation some children may revert to repeated addition for a problem like this, leading to errors.	Emphasise the need to estimate and to take care not to make any times-tables errors.
12*	↓ **Y5.NMD.6** Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	**MD** Use short division to divide 4-digit numbers by 1-digit numbers, including those which leave a remainder; spot patterns, make and test general rules, and check when an answer does not fit the predicted pattern.	£15·48	2	Errors such as £12·11 are due to weak understanding of the short division method. Answers of £1548 or £154·8 occur when children have 'taken out' the decimal point and failed to re-insert it correctly in the answer.	Check children's answers to Arithmetic test question 8 to determine if the short division method has been understood. If it has, then look at how this method can be extended to decimal numbers.
13*	**Y6.A.2** Generate and describe linear number sequences	**ALG** Continue, **generate and describe linear number sequences**.	4·21, 4·46, 4·71, 4·96	2	An answer of 4·11 for the first missing number suggests a mistake in adding on 0·25 from 3·96. Other errors will then follow.	Encourage children to look for patterns when continuing sequences, e.g. noticing that the final digit is alternately 1 and then 6 serves as a useful check.

14	**Y6.A.2** Generate and describe linear number sequences	**ALG** Continue, **generate and describe linear number sequences.**	a) ✔ b) ✖ c) ✖ d) ✔	2	Random patterns of true and false answers suggest a child does not understand how to apply a rule to any number.	Remind children that the 'place in the sequence' gives the number to be operated on, so, for example, to find the eighth number in the sequence, apply the rule to the number 8. If children find it tricky to calculate specific numbers in the sequence, they could list them all, i.e. 4, 11, 18, 25, 32, 39, 46, 53, 60, 67, 74, 81 … Note that this would be a false economy if having to find the 100th number in the sequence.

15	**Y6.RP.1** Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts **Y6.RP.4** Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	**FDRP** **Solve problems involving** simple ratios, i.e. **unequal sharing and grouping using knowledge of fractions and multiples.**	12	2	Possible errors include 19 (adding 16 to 3) or 22.	Once ratio has been understood the calculations are relatively easy (in this instance dividing 16 by 4 then multiplying by 3), so if children are making mistakes it suggests that this concept needs revising. In this case a visual model is helpful, building up patterns of equivalent ratios 4:3, 8:6, 12:9, 16:12.
			Total	**30**		

Marking guidance

↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	FDRP **Identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to 3 decimal places;** round decimal numbers to the nearest tenth and whole number.	532	1	Answers such as 53·2 or 0·532 suggest place-value errors.	Remind children how they have used a place-value grid to move numbers left or right for multiplying and dividing respectively. It is best to take each part of the calculation in turn, i.e. 5·32 ÷ 10 = 0·532; 0·532 × 1000 = 532, and writing down the answer to the first part is useful when doing this.
2*	**Y6.NF.7** Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places	FDRP **Identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to 3 decimal places;** round decimal numbers to the nearest tenth and whole number.	0·39	1	Answers such as 0·039 or 39 suggest place-value errors.	See above.

3*	**Y6.RP.2** Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison	**FDRP** **Solve problems involving the calculation of percentages and the use of percentages for comparison.**	36	1	An answer of 18 suggests that a child has found 10% rather than 20%. Other incorrect answers may be due to multiplication or division errors.	Check that children know the common percentage-to-fraction equivalents and how to use these to find fractional amounts.
4*	**Y6.RP.2** Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison	**FDRP** **Solve problems involving the calculation of percentages and the use of percentages for comparison.**	115	1	An answer of 230 suggests that a child has found 50% rather than 25%. Other incorrect answers may be due to division errors.	As above. Children may also find 25% of a number by halving and halving again.
5	**Y6.A.3** Express missing number problems algebraically	**ALG** **Express missing number problems algebraically** and identify appropriate methods in order to solve them.	49	1	An answer of 85 suggests that a child has added 67 and 18 rather than finding the difference.	Check that children have a good knowledge of inverse operations and practise with similar equations with one unknown.

6	**Y6.A.3** Express missing number problems algebraically	**ALG** **Express missing number problems algebraically** and identify appropriate methods in order to solve them.	8	1	Some children may give the answer 12 as the result of dividing 108 by 9. Other errors may be the result of ignoring the order of operations, e.g. subtracting 4 from 108 and attempting to divide by 9.	As above, include examples with brackets, reminding children of the order of operations. See also Problem solving and reasoning test, question 4.
7*	**Y6.NF.8** Multiply one-digit numbers with up to two decimal places by whole numbers **Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**FDRP** Multiply decimals by whole numbers by multiplying by 10/100 to make whole number calculations then dividing by 10/100 to find the answer.	97·98	2	An answer of 21·3 suggests a place-value error – forgetting the zero when multiplying by 20. Other errors may be due to mistakes in multiplying or in other aspects of the layout of long multiplication with a decimal.	Model how to solve by treating the decimal number as a whole number, i.e. 426 rather than 4·26 and remembering to put two decimal places back into the answer. Encouraging children to estimate can also support putting the decimal point back in the correct place. For other general problems with long multiplication layout, see advice for Problem solving and reasoning test, question 8.

8*	**Y6.ASMD.2** Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context	**MD** **Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division,** making approximations, **and interpret remainders as whole number remainders, fractions** (simplifying where possible or writing the fractional part of the answer as a decimal where the equivalent is known) **or by rounding as appropriate for the context.**	123	2	Errors can occur when children are unconfident with the long division method, or have worked out multiples of 23 incorrectly.	Model setting out the long division method, with 3-digit by 2-digit examples if needed.
9	**Y6.NF.3** Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	**FDRP** **Add and subtract fractions, with different denominators and mixed numbers using the concept of equivalent fractions.**	$\frac{7}{12}$	1	Give half a mark for an answer of $\frac{14}{24}$, i.e. the correct answer but not simplified. An answer of $\frac{11}{12}$ suggests that a child has added rather than subtracted. Other errors may occur if a child has used incorrect equivalent fractions.	Practise equivalent fractions using fraction walls and use contextualised problems to support children in visualising fraction problems, e.g. *$\frac{1}{4}$ of a pizza has already been eaten. Peter eats another $\frac{1}{6}$ of it. How much pizza is left?*

10	**Y6.NF.4** Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]	**FDRP** **Multiply simple pairs of proper fractions writing the answer in its simplest form;** understand that if two numbers less than 1 are multiplied, the answer is smaller than either.	$\frac{1}{6}$	1	Give half a mark for an answer of $\frac{2}{12}$, i.e. the correct answer but not simplified. Answers of $\frac{3}{7}$ or $\frac{11}{12}$ suggest that a child has confused multiplying fractions with adding.	As above, put fraction problems into a practical context. Remind children that although adding and subtracting fractions is tricky, multiplying is the easiest thing to do with fractions. Simply multiply each of the numerators and each of the denominators, remembering to simplify if possible.
			Total	**12**		

Marking guidance

↓ NC objective in a year below ↑ NC objective in a year above * Key question

Qu.	National curriculum objectives	Progression map outcome	Answers	Marks	Possible errors	Advice
1*	**Y6.NPV.1** Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit	**NPV** **Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.**	a) 745 916, 4 764 892, 7 453 619, 7 453 961 b) 0·059, 0·359, 0·95, 0·953 c) –17, –10·7, –7, 0·7	3	Give no marks if a child has started with the largest number rather than the smallest number, even if the four numbers are in the correct order. In (a) the number of digits in the large numbers confuses some children. In (b) some children find comparing numbers with different numbers of decimal places challenging. In (c) some children ignore the fact that some of the numbers are negative and place 0·7 first as they think it is the smallest number.	For each set of numbers, drawing or visualising a number line will provide support in ordering the numbers. Model this first for any children who are consistently making errors with ordering numbers. With ordering these decimals, it is useful to put the extra '0' in the two-place decimals so that all the numbers have an equal number of decimal places.

2	**Y6.NPV.3** Use negative numbers in context, and calculate intervals across zero	**NPV** **Use negative numbers in context, and calculate intervals across zero.**	35° C	1	Errors include 13° C (subtracting 11 from 24) or giving the answer as –35° C. Difference is always given as a non-directed integer.	As above, a number line will help. In this case, one with zero at the centre. This should support children in seeing the difference clearly as the sum of 11 and 24.
3*	**Y6.M.1** Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate	**MEA** Solve problems using standard units; read scales with accuracy.	1·25 m or 125 cm	2	An answer of 2·75 m suggests only one piece has been cut from the strip. A range of wrong answers is possible if the calculation of the units of one of the lengths is not converted into the other; the subtraction calculation needs to be done as either 350 cm – 225 cm or 3·5 m – 2·25 m.	Remind children that when solving problems with measure they need to take care with the units. Drawing a picture of (or visualising) a piece of string with three pieces cut from it helps with identifying the correct operations.
4*	**Y6.ASMD.6** Use their knowledge of the order of operations to carry out calculations involving the four operations	**AS** **Use knowledge of the order of operations**, including using brackets, **to carry out calculations involving the four operations.**	a) True b) False c) True d) False	2	Ignoring the brackets and rules for order of operations will lead some children to incorrect conclusions about these equations. The correct answer for (b) is 3 and for (d) is 2.	Children need to be reminded of the rules for order of operations, i.e. brackets first, then multiplication or division (the harder operations) before addition and subtraction. They should practise this by writing their own number sentences and seeing how the order of operations affects the answer.

5*	↓ **Y5.GPS.5** Use the properties of rectangles to deduce related facts and find missing lengths and angles **Y6.M.4** Recognise that shapes with the same areas can have different perimeters and vice versa	**MEA** Measure areas and perimeters; understand that area is a measurement of covering and is measured in square units and that perimeter is a length measured in mm, cm, m or km, for example; **recognise that shapes with the same areas can have different perimeters and vice versa.**	60 cm^2	2	An answer of 10 cm, or markings around the perimeter of the rectangle to show its length suggest that a child has only partly thought the problem through. An answer of 156 cm^2 suggests a child has subtracted 6 cm from 32 cm and taken 26 cm to be the length of the rectangle. An answer of 60 or 60 cm should be given 1 mark.	Children should realise that several steps are involved in a problem like this and they need a systematic approach. They should mark the rectangle to show the side opposite to 6 cm is also 6 cm, then use that and knowledge of the perimeter to find the lengths of the other two sides, before multiplying length by width to calculate the area.
6	↓ **Y5.NMD.11** Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates **Y6.RP.3** Solve problems involving similar shapes where the scale factor is known or can be found	**FDRP** **Solve problems involving similar shapes where the scale factor is known or can be found.**	1·4 m by 0·725 m	2	Answers of 56 m or 560 m and 29 m or 290 m suggest a child has multiplied the original lengths rather than divided. Answers of 14 m and 7·25 m suggest that the original lengths have been divided by 2 and a place-value error has occurred.	Remind children that a good way to divide by 20 is to halve the number and then divide by 10 using place-value knowledge (or vice-versa, dividing by 10 and then halving). Care always needs to be taken with place value when dividing decimals. When solving problems like this, children mustn't forget to estimate first and then consider if their answer makes sense.

7*	**Y6.ASMD.5** Identify common factors, common multiples and prime numbers	**MD**
		Know all multiplication and division facts up to 12 × 12; **identify common factors, common multiples and prime numbers.**
			a) 9
			b) 30
				2	For (a) some children may give the answer 3 since it is also a common factor of the numbers (though not the highest).
					
					For (b) some children may give the answer 15 or 18, which is a common multiple of just one pair of numbers.
					
					Other children may give random answers showing no understanding of the concepts of factors and multiples.
						Good times-table knowledge is helpful in quickly recognising factors and multiples; factors linked to division and multiples to multiplication facts respectively. Children who are struggling can look at a times-tables grid to help identify common factors or common multiples.

8*	**Y6.ASMD.1** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	**MD** **Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication** and solve problems involving multiplication of money and measures.	12 648 g	2	Some children may not recognise this as a multiplication problem and use incorrect operations. An answer of 2604 g suggests a place-value error, ignoring the zero when multiplying by 30.	As with all word problems, visualising or drawing a small sketch of the situation can help clarify which operation to use. If children are making errors with long multiplication, it may be necessary to go back through it, emphasising the layout, e.g. 5 4 1 6 x 1 5 5 4 1 6 0 2 7^{2} 0 8^{3} 0 1 1 8 1 2 4 0 Estimating before carrying out the calculation may also help alert children to errors with respect to this.

9	**Y6.S.2** Calculate and interpret the mean as an average	**STA** **Calculate and interpret the mean as an average.**	Weeks 1 and 8	2	An answer of 7 suggests that a child has correctly calculated the mean but has not answered the question. An answer of Weeks 2, 6 and 7 suggests that a child has confused mean with mode, i.e. the most commonly occurring score. Other errors may be due to incorrectly calculating the mean.	As well as a reminder of how to find the mean, it is important to give children the opportunity to answer questions that require them to interpret the meaning of data in some way, and not simply to stop at calculating it.
10	**Y6.GPD.1** Describe positions on the full coordinate grid (all four quadrants)	**GEO** Identify coordinates on the full coordinate grid; find missing coordinates for a vertex on a polygon or line.	A = (–5, 7) B = (2, 7) C = (–5, –3) D = (2, –3)	2	Some children may ignore the negative coordinates and give answers that reflect that, e.g. (5, 7) for A. Some may reverse each coordinate pair, giving the *y* (vertical) coordinate first.	Practise reading and plotting coordinates (in one quadrant, then two, and finally in all four quadrants if children are really confused) reminding children to always go 'along the corridor then up the stairs' when using coordinates.

11	**Y6.NF.1** Use common factors to simplify fractions; use common multiples to express fractions in the same denomination	**FDRP** Use knowledge of equivalence to compare and order fractions.	$\frac{3}{4}$ and $\frac{9}{12}$ $\frac{10}{12}$ and $\frac{30}{36}$ $\frac{25}{50}$ and $\frac{12}{24}$ $\frac{18}{27}$ and $\frac{2}{3}$	2	Random answers suggest that a child has not understood the concept. Some errors, e.g. putting $\frac{2}{3}$ with $\frac{12}{24}$ or $\frac{3}{4}$ with $\frac{30}{36}$, may be due to miscalculations.	Remind children of what equivalent fractions are, using visual examples, e.g. fraction walls. Good knowledge of times-tables facts helps with identifying equivalent fractions, e.g. recognising $\frac{2}{3}$ and $\frac{18}{27}$ as equivalent since 2 × 9 = 18 and 3 × 9 = 27. Emphasise that when going through the examples.
12	**Y6.RP.1** Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts	**FDRP** **Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.**	a) 12 b) 20	2	An answer of (a) 30 and/or (b) 75 suggests a misunderstanding of ratio or of the relationship between fractions and ratios.	Look at how fractions and ratios are related. Since the ratio of yellow to blue paint is 3:2, in every tin of green paint, $\frac{3}{5}$ is yellow and $\frac{2}{5}$ is blue. The fractions can then be used to calculate as necessary.

13	**Y6.GPS.3** Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons	**GEO** **Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons**; find missing angles at a point, vertically opposite, or on a straight line.	Two triangles should show angles of: 40°, 40°, 100° and 40°, 70°, 70°	2	Possible incorrect answers include triangles where the three angles do not total 180° or triangles with three different angles, showing that a child has not understood the idea of an isosceles triangle. Some children may only sketch one triangle, not realising that the given angle could be either one of the pair of equal angles or the one that is different from the other two.	Check children's knowledge of the different types of triangle: equilateral, scalene and right-angled, as well as isosceles. As with similar problems (see question 5 above) children need to start from what they know and build a model to identify what it is that they have to find. Practise similar problems. *A right-angled triangle has one angle of 35°; what are the sizes of the other two angles?*
14	**Y6.M.1** Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate	**MEA** Consolidate using 12 and 24-hour clocks; use counting up to calculate time intervals and count on and back in hours and minutes, bridging the hour, to find start and finish times; use timetables.	a) 45 minutes b) 1 hour 33 minutes or 93 minutes	2	An answer of 1 hour 15 minutes suggests that the child has believed 11:20 am to be the equivalent of 21:20 and, in doing the calculation, has ignored am and pm. A range of errors are possible in (b) if a child has either misread information in the timetable or attempted subtraction by decomposition.	For problems with (a) practise re-writing real 24-hour clock timetables, e.g. for local buses or trains, in 12-hour clock times. To address (b) look again at finding the difference between two times by counting on a number line, using the hours as significant markers, in this case 15 minutes from 21:45 to 22:00, then 1 hour to 23:00, then 18 minutes to 23:18, adding the three jumps to give the answer.

15	**Y6.S.1** Interpret and construct pie charts and line graphs and use these to solve problems	**STA** Read, **interpret and construct** tables, bar charts, pictograms, **pie charts and line graphs and use these to solve problems.**	a) 175 m b) Allow 235 m to 245 m	2	Errors are a result of children not calculating the value of each division on the 'distance' and 'time' scales.	Remind children to always work out the 'count-on' value of divisions and to write in missing numbers at all marked points on a scale.
			Total	**30**		