Year 5 Spring 2 Problem solving and reasoning
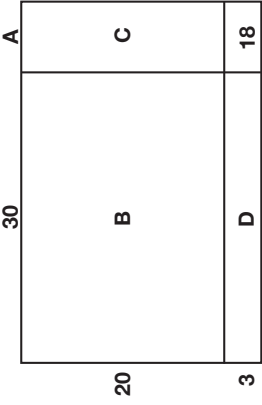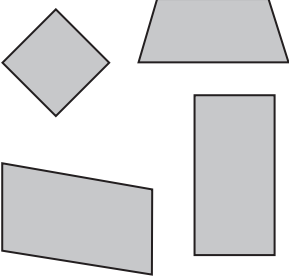
Marking guidance

↓ 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.NMD.5** Multiply and divide numbers mentally drawing upon known facts	**MD** **Multiply and divide numbers mentally drawing upon known facts.**	A = 6 B = 600 C = 120 D = 90	2	Errors include ones that suggest children are not clear about how grid multiplication works, e.g. 54 for A (multiplying 18 and 3, rather than dividing) and ones that involve place-value errors, e.g. 60 for B.	Looking at a rectangle model drawn to scale on squared paper may help with partitioning and place value. Point out that they need to work out A before they can find C. 30 A 20 B C 3 D 18
2	**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	**MD** Use a written method to multiply pairs of 2-digit numbers.	672	2	An answer of 52 suggests children have added rather than multiplied. Place-value errors with the grid method may produce answers such as 312 or 240.	Encourage children to draw or visualise the problem to help identify the correct operation for solving it. Estimating before carrying out a calculation such as this may help the child identify errors.

#	Objective		Question	Answer	Mark	Notes	
3*	**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 3-digit numbers by 1-digit numbers (including those that leave a remainder).		17	2	A child solving the division correctly but not understanding the problem context may give an answer of 16 r5 or 16. Other errors may occur if children are not confident with short division. You could check against questions 1 and 2 of the Arithmetic test for this.	As above, encourage drawing or visualising the problem. With interpreting remainders the context is critical. In this case rounding up so that there are enough adults: 16 is too few and 16 r5 makes no sense in the context.
4	**Y5.NF.5** Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**FDRP** Find unit and non-unit fractions of 2 and 3 digit numbers.	$\frac{1}{5}$ of £545		2	Look for evidence that a child has performed both division questions, i.e. £545 ÷ 5 = £109 and £636 ÷ 6 = £106 before concluding which is greater. If the child has evidence of attempting both divisions but has incorrect answers 1 mark can be given. Some children may multiply, showing they are not making the link between fractions and division.	If children are not making links between fractions and division, practise with smaller numbers that can be modelled using cubes and counters, e.g. what is $\frac{1}{4}$ of 20?

5	**Y5.NF.5** Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**FDRP** Find unit and non-unit fractions of 2 and 3 digit numbers.	153	2	An answer of 425 would suggest a child has divided by 3 (the numerator) then multiplied by 5 (the denominator). Other answers may be the result of calculation errors when dividing by 5 and multiplying by 3. In this case, 1 mark can be given.	For non-unit fractions children should find the unit fraction amount (in this case 51) and then use that to calculate the number of fifths.
6*	**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	**MD** Use short multiplication to multiply 3-digit numbers by 1-digit numbers, rounding to estimate answers.	Triangle	2	Look for evidence that the child has performed both multiplication questions, i.e. $127 \times 4 = 508$ and $176 \times 3 = 528$ before concluding which shape has the longer perimeter. If the child has given evidence of attempting both calculations but has given incorrect answers 1 mark can be given, since the correct operation has been identified.	Check children are laying out questions correctly and exchanging, where appropriate, when using short multiplication.

	Y5.GPS.6	GEO				
7	**Y5.GPS.6** Distinguish between regular and irregular polygons based on reasoning about equal sides and angles	**GEO** Identify and describe different types of quadrilaterals and their properties.		2	The properties are in different orders amongst the descriptions. One approach is to focus on one particular property, e.g. number of right angles, and sort the shapes, eliminating some, thus reducing the number of possibilities from which to choose.	Practise sorting shapes using Venn or Carroll diagrams using properties such as symmetry, right angles, parallel or perpendicular sides.
8	**Y5.GPS.6** Distinguish between regular and irregular polygons based on reasoning about equal sides and angles	**GEO** Use mathematical reasoning to identify properties of different polygons, including equal sides and angles and explain findings.	Answers will vary – check each one.	2	For part (a) some may draw a square, suggesting they have not yet understood that a square is a rectangle. For parts (b) and (d) check both properties are addressed; for part (c) check the number of sides. Do not give a mark to children who have drawn freehand or not used the dots as corners.	Practise making a variety of polygons on a geo-board.

	Objective	Answer	Marks	Notes	
9	**Y5.M.2** Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints	**MEA** **Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.**	a) miles b) pints c) inches d) pounds	2	Some children may mix up pounds and pints (mass and capacity respectively), others will confuse inches and miles in terms of scale.	Further discussion about which imperial units relate to which metric units may be needed. A class display of different objects with the units of length, capacity and mass labelled in both metric and imperial units may help.
10	**Y5.M.2** Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints	**MEA** **Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.**	Peter	2	Award marks for evidence that one of the distances has been converted before the comparison is made. Peter's 20 miles is equivalent to 32 km or Pierre's 24 km is equivalent to 15 miles.	A line with km above and miles below is a good visual image to help with this type of problem: 0 8 16 24 32 40 km 0 5 10 15 20 25 miles
11*	**Y5.NF.3** Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]	**FDRP** Place fractions on a number line and count in steps of a given fraction, using equivalence.	a) $\frac{5}{8}$; $1\frac{3}{8}$ b) $3\frac{3}{4}$; $2\frac{1}{4}$	2	Errors such as $\frac{6}{16}$, or $\frac{4}{8}$ for part (a) and $3\frac{1}{2}$, 3 or 2 for part (b) suggest children are not counting accurately in fractions or seeing the patterns in the numbers given. Some children will find part (b) trickier as numbers are presented as a backwards sequence.	Practise counting in common fractions, with a number line to support. Doing this on a regular basis will help children. For a 'backwards' sequence, remind children that they can always start with the last number and count forward.

#	Objective		Answer	Marks	Marking notes	Additional guidance
12	**Y5.NF.3** Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]	**FDRP** **Recognise mixed numbers and improper fractions and convert from one form to the other,** look for patterns and write rules.	a) $5\frac{2}{5}$ b) $\frac{39}{10}$	2	In part (a) a possible error is $2\frac{7}{5}$, showing a poor understanding of the relationship between a mixed number and the equivalent improper fraction. In part (b) $\frac{27}{10}$ is a possible error. These errors typically occur when children have incorrectly memorised a rule.	Some children may be helped by showing them, for example, how: $\frac{27}{5} = \frac{5}{5} + \frac{5}{5} + \frac{5}{5} + \frac{5}{5} + \frac{5}{5} + \frac{2}{5}$ $= 1 + 1 + 1 + 1 + 1 + \frac{2}{5}$ $= 5 + \frac{2}{5}$ $= 5\frac{2}{5}$
13	**Y5.NF.5** Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	**FDRP** **Multiply proper fractions by whole numbers** in a practical or real-life context.	$4\frac{3}{8}$	2	Look for evidence that children have multiplied the fraction by 7. Where there is evidence of this and the answer has been left as an improper fraction (i.e. $\frac{35}{8}$) 1 mark can be given.	Drawing a picture to illustrate the fractions often helps. You could also practise counting up in eighths on a fraction number line.

14*	**Y5.NAS.4** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Count up to solve 4-digit minus 4-digit subtractions from near multiples of 1000, where column subtraction is awkward; use column subtraction where appropriate.	808	2	An answer of 1212 suggests a child has set out the correct column subtraction but simply found the difference between the largest and smallest digit in each place. Other incorrect answers may be the result of using the wrong numbers from the table or adding rather than subtracting.	If the mistake is due to errors in using the written algorithm (and this is duplicated in questions 7 and 8 in the Arithmetic test) it would be useful to remodel using the expanded method.
15*	**Y5.NAS.4** Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**AS** Use columnar addition to add more than two numbers with up to 4 digits.	3552	2	Errors will occur if the wrong numbers are used for the calculation or if it is not set out properly. Arithmetical errors can be made when adding three numbers, even when children are secure with adding two numbers.	The best advice to children is to always read questions carefully, identify the appropriate information and the calculation, and to check answers carefully.
			Total	**30**	