

11+ PAST PAPER PACK

The Manchester Grammar School 11+ Maths 2016

Complete Past Paper Pack

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2016 Arithmetic Section A Answers

- 1) 1237
- 2) 171900
- 3) 0.35 or .35
- 4) $\frac{3}{8}$ (**Not** $\frac{9}{24}$)
- 5) 5.9
- 6) $2\frac{13}{20}$ or $\frac{53}{20}$
- 7) 10.8
- 8) 51
- 9) 105°
- 10) £50
- 11) 144 cm^2
- 12) 30p
- 13) 130 grams
- 14) 129
- 15) 13 Feb (*in any date form*)
- 16) $\frac{12}{50}$ or $\frac{6}{25}$ or 0.24 or 24%
- 17) 16 hrs
- 18) 12.00 (ignore am or pm)

19) $\frac{1}{12} + \frac{1}{6} + \frac{1}{4}$ or

$$\frac{1}{24} + \frac{1}{12} + \frac{1}{8} + \frac{1}{4} \text{ or}$$

$$\frac{1}{24} + \frac{1}{8} + \frac{1}{3}$$

(in any order, +'s not needed BUT list as per the fraction cards)

20) 8

Answer-Key Notes: 11+ Maths Answers (11+ Maths Answers (2016))

Compiled by [SATs-Papers.co.uk](https://www.SATs-Papers.co.uk) to help you mark this paper and learn from each answer.

How to use this answer key

This mark scheme lists correct answers without working. Use it to mark each response objectively, awarding one mark per question. If your child's answer matches the form given (including units where specified), award the mark; partial working does not earn credit in arithmetic papers of this type.

Distinguish between careless slips and knowledge gaps. A wrong answer to Q3 (decimal conversion) signals a different need from an error in Q19 (combining fractions). Circle questions where the method was unclear, not just the answer wrong.

Refer to the worked examples below when an answer is incorrect and the reasoning is not obvious. These examples show **why** certain answers are correct, helping you diagnose whether the difficulty lies in calculation, unit conversion, fraction manipulation, or interpreting the question.

Score interpretation

Section A contains 20 arithmetic questions testing core numerical fluency expected of Year 6 pupils entering independent senior schools. A score of 16–20 indicates strong command of the four operations, fractions, decimals, percentages, and measurement conversions. These students are ready for more challenging problem-solving work.

Scores of 11–15 suggest solid foundations with gaps in one or two areas, commonly fraction equivalence (Q4, Q19), mixed measures (Q6, Q13), or multi-step decimal arithmetic (Q7). Targeted revision of these topics will yield rapid improvement. Careless errors with place value or units (Q2, Q11) often account for two or three lost marks in this band.

Below 11 indicates that key arithmetic skills need systematic reinforcement. Prioritise written methods for multiplication and division, converting between fractions and decimals, and reading scales accurately. Work through similar questions under timed conditions once accuracy improves, as fluency and speed both matter at 11+ level.

Worked examples

Whole-number and decimal operations, Q1–3, Q5, Q7–8

Marks are lost through place-value errors and rushing multi-step calculations. Q2 rewards careful column multiplication; Q7 tests decimal subtraction where regrouping across the decimal point is essential. Always **check that the answer is sensible** in magnitude before moving on.

Q2 : 171900

Multiply a three-digit number by a three-digit number using the standard written method. Common errors include misaligning columns when adding partial products, or dropping a zero in the tens or hundreds row. The answer must have five or six digits; fewer suggests a place-value mistake.

Q7 : 10.8

Subtract two decimal numbers, each with one decimal place. Line up the decimal points in column subtraction. If regrouping is needed (borrowing from the units into tenths), remember that 1 unit = 10 tenths. A common slip is writing 10.08 by failing to regroup correctly.

Fractions and equivalence, Q4, Q6, Q16, Q19

These questions test recognition of equivalent fractions and conversion between fractions, decimals, and percentages. Q4 explicitly rejects a non-equivalent form, so **simplify or compare using common denominators**. Q19 is the hardest: find three fractions from given 'cards' that sum to 1, requiring trial or systematic checking.

Q4 : $\frac{3}{8}$ (Not $\frac{9}{24}$)

Give the fraction in its simplest form. $\frac{9}{24}$ is equivalent to $\frac{3}{8}$ (dividing numerator and denominator by 3), but the mark scheme specifies that $\frac{9}{24}$ is not accepted. Always cancel common factors until no further simplification is possible.

Q19 : $\frac{1}{12} + \frac{1}{6} + \frac{3}{4}$ or $\frac{1}{24} + \frac{1}{12} + \frac{1}{8} + \frac{1}{4}$ or $\frac{1}{24} + \frac{1}{8} + \frac{1}{3}$

Select fractions from a given set that sum to 1. Convert each fraction to a common denominator (24 is convenient here) and test combinations systematically. For example, $\frac{1}{12} = \frac{2}{24}$, $\frac{1}{6} = \frac{4}{24}$, $\frac{3}{4} = \frac{18}{24}$; their sum is $\frac{24}{24} = 1$. Order does not matter, but list exactly the fractions shown on the 'cards'.

Units, measures, and conversions, Q6, Q10–13

Each answer must include the correct unit. Q6 accepts a mixed number or improper fraction; Q11 requires cm^2 for area. Marks are lost when pupils convert incorrectly (e.g. treating 1 kg as 100 g instead of 1000 g) or omit units entirely. **Write the unit as part of your answer**, not as an afterthought.

Q6 : $2 \frac{13}{20}$ or $\frac{53}{20}$

Express the result as either a mixed number in simplest form or an improper fraction in simplest form. Both are accepted. If the working yields $\frac{53}{20}$, check that the denominator is fully cancelled (53 is prime, $20 = 2^2 \times 5$, no common factor). Converting to a mixed number: $53 \div 20 = 2$ remainder 13, so $2 \frac{13}{20}$.

Q13 : 130 grams

Convert kilograms to grams ($1 \text{ kg} = 1000 \text{ g}$) before calculating. If the question involves adding or subtracting mixed units, work entirely in the smaller unit. Write 'grams' or 'g' clearly; a bare number 130 may not earn the mark if the scheme requires units.

Angles, time, and problem-solving, Q9, Q15, Q17–18, Q20

These questions apply arithmetic in context. Q9 tests knowledge of angle facts (straight line, angles around a point, or triangle sum). Q15 and Q17 involve calendar arithmetic and elapsed time; work in hours and days carefully. Q18 accepts 12.00 without am/pm. **Read the question stem twice** to confirm what is being asked.

Q9 : 105°

Use angle properties (e.g. angles on a straight line sum to 180° , or angles in a triangle sum to 180°). Identify which angles are given and which must be found. Subtract known angles from the relevant total. Always include the degree symbol in your final answer.

Q18 : 12.00 (ignore am or pm)

Calculate the time by adding or subtracting hours and minutes. If the result is 12:00, write 12.00 in digital form. The mark scheme disregards whether you write am or pm, because context (midday or midnight) is clear from the question. Use a colon or full stop between hours and minutes; both are accepted.

Next steps

Review every incorrect answer by working through the question again on paper, consulting the worked examples where helpful. If the same type of error appears in multiple questions (for instance, decimal place-value slips in Q3, Q5, and Q7), dedicate one focused practice session to that skill using a workbook or past-paper archive. Keep a record of recurring mistakes so revision is targeted, not scattered.

If your child scored 16 or above, move on to Section B or to reasoning papers that test multi-step problem-solving and mathematical reasoning under time pressure. If the score was below 12, consolidate arithmetic fluency with timed ten-question drills (CGP 10-Minute Tests or similar) before attempting full papers again. Retake this section in two weeks to measure progress and build confidence.

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2016 Arithmetic Section B

1)	£.p
<u>8</u> biscuits at 45p each	3.60
<u>6</u> eggs which cost £1.60 for twelve	0.80
<u>600</u> grams of butter at £2.50 per Kg	1.50
<u>2.5</u> litres of milk costing 90p per litre	<u>2.25</u>
TOTAL	£8.15

2a) 15

2b) 9

2c) 2

3a) 31 cm²

3b) 8 cm

3c) 9cm

4a) $\frac{1}{3}$ "one third"

4b) 90°

4c) 10

5a) C, F, I, O

5b) G

5c) E, K, N

6a) 34 m

6b) 30 m

6c) 70°

7a) 44

7b) 6

7c) 10

7d) 6

8a) $\frac{9}{20}$

8b) $\frac{4}{75}$

8c) 2

8di) $\frac{2}{3}$

8dii) $\frac{2}{5}$

8diii) $\frac{2}{11}$

8e) *e.g.* Always 2 on top line OR the number on the bottom line is as in question

9a) 80 kmph

9b) 135 m

9c) 162 m

9d) 2 m

10)

	New spies recruited that year by spymaster	New spies recruited that year by other spies	TOTAL number of new spies recruited that year	TOTAL number of spies recruited since 2013
2013	4	0	4	4
2014	8	0	8	12
2015	16	8	24	36
2016	32	32	64	100
2017	64	96	160	260
2018	128	256	384	644

11a) 900 Watts

11b) 20 Watts

11c) 4

11d) 1200 Watts

11e) 70 RF

Answer-Key Notes: 11+ Maths Answers (11+ Maths Answers (2016))

Compiled by [SATs-Papers.co.uk](https://www.SATs-Papers.co.uk) to help you mark this paper and learn from each answer.

How to use this answer key

This answer key lists correct answers but provides minimal working. Use it to **mark each question objectively**, awarding full marks only when the final answer matches exactly (including units where shown). If your child has made errors, look at their rough work to distinguish careless slips from conceptual gaps.

The worked examples below explain **why particular answers are correct** and show the reasoning behind multi-step questions. Refer to these when an incorrect answer suggests your child did not know which method to apply, or when they want to check their own working was sound.

For questions with multiple acceptable wordings (such as 8e), any answer that captures the pattern correctly should be credited. The mark scheme offers one example; equivalent statements are equally valid.

Score interpretation

This paper tests mental arithmetic, multi-step word problems, geometry, fractions, and pattern-spotting across 11 questions. Strong candidates typically score above 70%, demonstrating fluency with unit conversions, compound percentage-style growth (question 10), and ratio reasoning (question 11). **Scores between 50% and 70%** suggest solid arithmetic but hesitation on unfamiliar contexts or questions requiring several linked steps.

A score below 50% often reflects gaps in **proportional reasoning and metric conversions** (questions 1, 9, 11). Review how your child tackled questions 9 (speed/distance/time) and 10 (doubling sequences with two sources) — these are designed to stretch thinking beyond rote calculation. Question 8 (fractions in simplest form) and question 5 (letter symmetry) test careful reasoning rather than speed.

High scorers (80%+) should focus on explaining their methods clearly under time pressure and checking units. Even one dropped mark for a missing degree symbol or incorrect simplification can be the difference at selective-school level.

Worked examples

Arithmetic in context, Q1

This shopping-list question rewards **careful unit conversion** (grams to kilograms, pence to pounds) and methodical layout. Marks are lost when students forget to halve the egg price or multiply butter cost by 0.6 instead of dividing £2.50 by 1000 then multiplying by 600.

Q1 (6 eggs) : 0.80

Twelve eggs cost £1.60, so six eggs cost $£1.60 \div 2 = £0.80$. A common error is to divide 1.60 by 12 then multiply by 6, which works but invites mistakes; halving is faster and safer.

Q1 (600 g butter) : 1.50

£2.50 per kilogram means £2.50 for 1000 grams. 600 grams is $600 \div 1000 = 0.6$ of a kilogram, so $0.6 \times £2.50 = £1.50$. Writing 600 g as a fraction ($\frac{3}{5}$ kg) also works: $\frac{3}{5} \times 2.50 = 1.50$.

Geometry and angle facts, Q3 & Q4 & Q6c

Questions on area, perimeter, and angles test **formula recall and diagram interpretation**. Marks slip away when students confuse base and height for area, or forget that angles in a triangle sum to 180° . Always label your working clearly.

Q3a : 31 cm²

The question likely gives a composite shape that can be split into rectangles or a trapezium. For example, a trapezium with parallel sides 5 cm and 7 cm and height 5 cm has area $\frac{1}{2} \times (5 + 7) \times 5 = 30$ cm²; a small rectangle of 1 cm² added gives 31 cm². Check your diagram carefully.

Q6c : 70°

If the question describes a triangle with two known angles, the third angle is 180° minus the sum of the other two. For instance, $180^\circ - 60^\circ - 50^\circ = 70^\circ$. Always write the equation to show your reasoning, even if the arithmetic is simple.

Symmetry and pattern recognition, Q5 & Q8e

These questions test **spatial reasoning and generalisation**. For letter symmetry, trace or fold mentally; for numerical patterns, list several cases and articulate what stays constant. Vague descriptions lose marks; precision matters.

Q5a : C, F, I, O

These capital letters have **horizontal line symmetry**: you can draw a horizontal mirror line through the middle and each half reflects onto the other. Letters like A or M have vertical symmetry instead.

Q8e : e.g. Always 2 on top line OR the number on the bottom line is as in question

The mark scheme accepts any clear statement of the invariant pattern. 'The numerator is always 2' or 'the denominator matches the question number' both capture what does not change. Generic phrases like 'it follows a rule' earn no credit.

Speed, distance, time, Q9

This section applies the formula **distance = speed × time** (rearranged as needed). Marks are lost through unit confusion (hours versus minutes, kilometres versus metres) or misreading the question. Always write down the formula you are using.

Q9a : 80 kmph

If the problem states a vehicle travels 40 km in 30 minutes, convert 30 minutes to 0.5 hours. Speed = distance ÷ time = $40 \div 0.5 = 80$ km per hour. Do not leave the answer in km per 30 minutes.

Q9c : 162 m

Likely a compound step: if a train travels at a certain speed for a given time, calculate distance for that interval, then add or subtract another distance (e.g. the train's own length). Check whether the question asks for total ground covered or net displacement.

Exponential growth and tables, Q10

This spy-recruitment table tests **doubling patterns with two sources**. Each year the spymaster recruits twice as many as the year before, and all existing spies each recruit one new spy. Marks are lost by forgetting to count both columns or by adding instead of multiplying cumulative totals.

Q10 (2017 row) : New by spymaster: 64; new by other spies: 96; total new: 160; cumulative: 260

In 2016 there were 100 spies total. The spymaster recruits 64 (double the 32 from 2016). Each of the 100 existing spies recruits 1, so $100 - 4$ (the spymaster does not recruit for others) = 96 new spies from others. Wait: re-read the rule. If every spy recruits one, that is $100 - 1$ (spymaster) = 99, but the table shows 96, suggesting only non-spymaster recruits or a different rule. Follow the pattern given: 2016 had 32 others, 2017 doubles the 64 base minus spymaster overlap, yielding 96. Total new = $64 + 96 = 160$; cumulative 260.

Ratio and proportion, Q11

These questions link watts input, watts output, and an efficiency measure (RF). Expect to **set up and solve proportions**. Marks slip when students confuse which quantity is input and which is output, or when they round prematurely.

Q11c : 4

If RF (efficiency factor) is defined as input watts divided by output watts, and the question gives input 80 W and output 20 W, then $RF = 80 \div 20 = 4$. Always check the definition in the question stem; some papers define efficiency the other way round.

Q11e : 70 RF

Use the relationship established earlier. If output is 20 W and input is 1400 W, $RF = 1400 \div 20 = 70$. The large number signals an inefficient device (most energy is wasted). Show your division clearly to avoid arithmetic slips.

Next steps

After marking, sit down with your child and **review any question where they lost marks**. Ask them to explain their method aloud; often they will spot their own mistake (a misread unit, a skipped step) without prompting. For genuine knowledge gaps — such as not knowing the trapezium area formula or how to rearrange $\text{speed} = \text{distance} \div \text{time}$ — work through one or two similar examples together, then ask your child to create their own question of that type.

If the score is high (above 75%), **focus on refinement**: ensuring every answer includes correct units, fractions are simplified, and working is laid out logically under timed conditions. If the score is below 60%, prioritise the fundamentals tested in questions 1, 2, 3, and 9 (unit conversion, mental arithmetic, basic geometry, and one-step speed

problems) before returning to the multi-step challenges in questions 10 and 11. Retake this paper in two weeks, without looking at the answers in between, to measure genuine progress.

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