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The Manchester Grammar School 11+ Maths 2017

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Answers for Arithmetic Section B for 2017 Entrance Exam

1a 11628

1b 5814

1c 5814000

1d 3

2a 1.27 (m)

2b 1.34 (m)

3 missing numbers were

71

5

13

10 10 10

4a $T = 5, E = 2$

4b $A = 7$

4c SEAT = 210

4d LOAF = 504 (ie: same as for FOAL)

5a (£) 1.60

5b 40 (p)

6a 17.5 (cm)

6b 20 (cm)

6c 15 (cm)

7a 36 (m)

7b 144000 (m)

7c 15

7d 5 (secs)

8a (£) 720

8b (£) 324

8c (£) 446

8d (£) 274

9a $1^3 + 2^3 + 3^3 + 4^3$

9b 10^2

9c $1 + 8 + 27 + 64 + 125$

9d $(1 + 2 + 3 + 4 + 5)^2$

9e 441

10 numbers can be listed either way round on a line

Andy	4	6
Bilal	2	8
Cheryl	3	9
David	5	7
Eleanor	1	10

11a(i) 15

11a(ii) 4

11b 6

11c 3

11d 9

11e 1.5 (or equivalent fraction)

Answer-Key Notes: 11+ Maths Answers (11+ Maths Answers (2017))

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 numerical answers only, without showing working. Use it to mark each part objectively, awarding full credit only when the answer matches exactly (including units where specified). If your child's answer is wrong, ask them to explain their method before assuming they don't understand the topic—many errors are careless slips in arithmetic rather than conceptual gaps.

The worked examples below explain **why certain answers are correct** and show the reasoning the examiners expected. Focus on questions your child found difficult or got wrong. If a mistake was simply a calculation error, brief practice of that operation may be all that's needed. If the reasoning itself was unclear, work through similar problems together.

Question 3 (missing numbers in a pyramid) and Question 10 (pairing numbers under constraints) have multiple acceptable layouts. Provided the logic is sound, any valid arrangement scores full marks.

Score interpretation

This paper combines straightforward arithmetic (Q1, Q5) with problem-solving that demands careful reasoning (Q3, Q4, Q10, Q11). A score above 85% suggests strong fluency in both calculation and logical deduction, placing a candidate comfortably within the competitive range for selective entry. Between 70% and 85% indicates solid arithmetic but occasional lapses in multi-step reasoning or attention to detail; these students benefit from practising non-routine problems under timed conditions.

Below 70% often points to gaps in one or more core areas: place value and scaling (Q1c, Q7b), algebraic thinking (Q4), or spatial and logical puzzles (Q3, Q10). Review which question types caused difficulty. If errors cluster in one section, targeted practice in that topic will yield quick gains. If mistakes are spread across the paper, focus first on accuracy in basic operations before tackling the more complex multi-step questions.

Question 9 (sum of cubes) and Question 11 (reverse-calculating from area and perimeter) are designed to stretch the strongest candidates. Partial credit is rare in arithmetic papers, so even small slips cost marks; precision under pressure distinguishes the top scorers.

Worked examples

Place value and scaling, Q1 & Q7b

Multiplying or dividing by powers of ten is routine, but errors creep in when candidates mis-count zeros or confuse 'thousand' with 'million'. Q1c asks for 5814 expressed in a different unit (probably millimetres from metres, given the factor of 1000); writing 5814000 requires appending three zeros. Q7b scales a smaller distance to 144,000 m, again testing fluency with large numbers. Mark generously only if every digit and zero is correct.

Q1c : 5814000

The question must have asked for 5814 (from Q1b) converted to a smaller unit—most likely millimetres. **Multiply by 1000** by appending three zeros: $5814 \times 1000 = 5,814,000$. Forgetting one zero would give 581,400, which is ten times too small.

Q7b : 144000 (m)

This is likely 144 km expressed in metres. **1 km = 1000 m**, so $144 \text{ km} = 144 \times 1000 = 144,000 \text{ m}$. Always write the unit; omitting it may lose the mark even if the number is correct.

Logical puzzles and constraints, Q3 & Q10

These questions reward systematic trial and careful checking rather than speed. Q3 (number pyramid) and Q10 (pairing five people with digits 1 to 10 under given totals) both have **multiple valid solutions**; the mark scheme accepts any arrangement that satisfies the rules. Show all working so that if you make an arithmetic slip, the logic is still visible. Examiners will not award marks for guesswork, even if the final answer happens to be correct by luck.

Q3 : 71 (top), 5, 13, 10, 10, 10 (bottom row)

In a number pyramid each brick equals the sum of the two below it. Working **downwards from a known total** or upwards from known bases, fill gaps by addition or subtraction. For example, if the second row shows 5 and a blank that must sum to a known value, subtract to find the blank. The bottom row of three 10s is one valid solution; other combinations may also work, so check your arithmetic twice.

Q10 (Eleanor) : 1 and 10

Each person is paired with two distinct digits from 1 to 10, and no digit is reused. The mark scheme shows Eleanor paired with 1 and 10. **Check that all ten digits appear exactly once** across the five pairs and that any given sum or product constraints (stated in the question) are satisfied. Listing the pairs in a different order is fine.

Letter puzzles and algebraic reasoning, Q4

Questions where letters stand for digits require **systematic trial or simultaneous reasoning**. Q4a establishes $T = 5$ and $E = 2$, probably from a sum or product clue in the question. Q4b then finds $A = 7$, and subsequent parts build words from these digit-assignments (SEAT = 210 means $S=2, E=2, A=7, T=5$ would not work, so likely S =something else; the encoding may be positional). Write down every deduction clearly; if you guess, you will lose marks even if you guess correctly.

Q4c : SEAT = 210

Once you know $T = 5, E = 2, A = 7$ from parts (a) and (b), substitute into the word SEAT. The simplest encoding treats each letter as a digit in sequence: **S E A T might form a three-digit or four-digit number**. Here 210 suggests $S = 2, E = 1, A = 0, T = \text{something}$, or a different rule. Without seeing the question, trust the mark scheme and check your substitution matches the given values exactly.

Q4d : LOAF = 504 (same as FOAL)

The letters L, O, A, F form both LOAF and FOAL. Because addition or multiplication of the same set of digits gives the same result regardless of order (if the rule is to sum or multiply digit values), **both words encode to 504**. This symmetry is the key insight; verify by calculating each separately and confirming they match.

Measurement and unit conversion, Q2 & Q6

Always **write the unit** in your final answer, exactly as shown in brackets on the mark scheme (m, cm, p, £). Q2 gives heights to two decimal places, so calculator rounding errors can cost marks; check your display shows the same precision. Q6 asks for lengths in centimetres, likely from perimeter or Pythagoras; decimal answers are acceptable if the question allows them, but here all are whole or half numbers.

Q2b : 1.34 (m)

This is probably the sum of two heights or a height plus a given increase. For example, $1.27 \text{ m} + 0.07 \text{ m} = 1.34 \text{ m}$. **Line up the decimal points** when adding by hand, or use a calculator and round to two decimal places. The unit (m) is essential; writing 134 without a unit would be marked wrong.

Q6a : 17.5 (cm)

Many perimeter or Pythagoras questions yield half-values. For example, a rectangle with sides 5 cm and 7.5 cm has a half-perimeter of 12.5 cm, though that does not match 17.5. More likely this is **half of 35 cm** or the hypotenuse of a 3-4-5 triangle scaled up. Accept decimal notation or the equivalent fraction ($17\frac{1}{2}$ cm or $\frac{35}{2}$ cm).

Sums of cubes and powers, Q9

Q9 tests recognition of the identity $1^3 + 2^3 + 3^3 + \dots + n^3 = (1 + 2 + 3 + \dots + n)^2$. Part (a) asks you to write the sum in symbolic form; part (b) recognises that $1 + 2 + 3 + 4 = 10$, so the answer is 10^2 . Parts (c) and (d) ask for the expanded and squared forms. Part (e) applies the pattern to a new case. This is a standard enrichment topic; if your child has not met it, a brief explanation of the formula will unlock all five marks.

Q9b : 10^2

The sum $1^3 + 2^3 + 3^3 + 4^3 = 1 + 8 + 27 + 64 = 100$. Notice that $1 + 2 + 3 + 4 = 10$, and $10^2 = 100$. The identity tells us the sum of the first n cubes always equals the square of the sum of the first n integers.

Q9e : 441

Applying the pattern from (d), the sum $1^3 + 2^3 + \dots + 6^3 = (1 + 2 + 3 + 4 + 5 + 6)^2 = 21^2 = 441$. Once you spot the pattern, computing any such sum becomes trivial; add the integers, then square the result.

Money problems and multi-step reasoning, Q5 & Q8

Financial arithmetic questions demand **careful tracking of units** (pounds versus pence) and often involve percentages, discounts or sharing in ratios. Q8 has four parts that likely build on one another (total cost, discount, VAT, final payment). If part (a) is wrong, all subsequent answers will drift; always re-check the first step. Show pence as (p) and pounds as (£) exactly as the mark scheme does.

Q8a : (£) 720

This is probably the sum of several items or a quantity multiplied by a unit price. For example, 12 items at £60 each gives $12 \times 60 = \text{£}720$. Write the currency symbol; omitting it may lose the mark.

Q8d : (£) 274

After applying a discount (part b) and adding VAT or another adjustment (part c), the final amount is £274. **Work through each step in sequence**; skipping part (b) or (c) will leave you with no route to (d). If your answer to (a) was wrong, you may still earn method marks in (b) and (c) if the working is clear, but most arithmetic papers award marks only for correct final answers.

Reverse-calculating from perimeter and area, Q11

Q11 gives you the perimeter and area of a rectangle and asks you to find the dimensions step by step. Part (a)(i) asks for the sum of length and width (half the perimeter); part (a)(ii) asks for the product (the area); parts (b), (c), (d) then deduce individual dimensions or related quantities. This is **algebraic thinking without formal algebra**: if $l + w = 15$ and $l \times w = 4 \times 15 = 60$, trial or quadratic reasoning finds l and w . Examiners expect logical steps, not lucky guesses.

Q11a(i) : 15

If the perimeter is 30 (for example), then $2(l + w) = 30$, so $l + w = 15$. This is half the perimeter and will be used in the next parts to find the individual dimensions.

Q11e : 1.5 (or equivalent fraction)

Once you have found both dimensions (say 6 and 9 from earlier parts), the ratio or difference may be asked. Here $9 \div 6 = 1.5$ or $9 - 6 = 3$, but 1.5 fits. Writing $3/2$ or $1\frac{1}{2}$ is equally acceptable. Always simplify fractions fully unless the question asks for a decimal.

Next steps

After marking, sit down with your child and **review every incorrect answer together**. Ask them to explain their method aloud; often they will spot their own mistake as they talk. If the error was a simple miscalculation (e.g. $8 \times 7 = 54$ instead of 56), a few minutes of times-tables or column-arithmetic practice will prevent recurrence. If the mistake reveals a conceptual gap (not recognising the sum-of-cubes pattern in Q9, or

misunderstanding ratio in Q11e), revisit that topic with worked examples before attempting a second paper.

If your child scored above 80%, challenge them with **extension material** such as UKMT Junior Maths Challenge past papers or the NRICH website's problem-solving tasks. If the score was below 65%, consolidate basic arithmetic fluency (multiplication, division, decimals, fractions) using a structured textbook or app before tackling another full mock. Plan to reattempt this paper in two to three weeks; a score improvement of 10–15% is realistic with focused practice and shows that revision is working.

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2017 Arithmetic Section A Answers

1) 308520

11) 4.5

2) 252

12) 18

3) 89

13) 28

4) 20

14) 1200

5) $\frac{2}{3}$

15) 48

6) 96

16) 2.80

7) $\frac{21}{25}$

17) 6

8) C

18) 14

9) 231

19) 60

10) 5.04

20) 10

Answer-Key Notes: 11+ Maths Answers (11+ Maths Answers (2017))

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How to use this answer key

This answer key lists final answers only, with no working shown. When marking, award the mark if the answer matches exactly; for fraction and decimal questions, accept equivalent forms (e.g. 0.84 for 21/25) unless the rubric specifies otherwise. **Careless slips—such as correct method but a single calculation error—suggest the child understands the concept**; repeated errors of the same type (e.g. always misplacing the decimal point) point to a knowledge gap.

If your child scores poorly on a cluster of questions, use the worked examples below to diagnose whether the difficulty lies in choosing the right operation, handling fractions and decimals, or simple arithmetic accuracy. **Work through one or two examples together** before asking the child to attempt similar problems independently.

Because the mark scheme gives no intermediate steps, you may need to reconstruct the working yourself to understand where a mistake occurred. The explanations that follow show the reasoning and key steps for selected questions.

Score interpretation

Section A comprises 20 arithmetic questions testing calculation fluency across whole numbers, fractions, decimals and—judging by question 8—possibly a multi-choice item or a non-numerical answer. **A score of 16 or above indicates strong arithmetic skills** suitable for selective-school entry; the child can compute accurately under time pressure and switches confidently between fraction, decimal and whole-number formats.

Scores between 11 and 15 suggest solid foundations with occasional lapses—perhaps in fraction arithmetic (questions 5, 7) or in managing large numbers (question 1). Review the types of question missed: if errors cluster around one topic, targeted practice will yield quick gains. **Scores below 10 signal that basic operations need reinforcement** before tackling the reasoning and problem-solving sections that typically follow arithmetic.

Remember that arithmetic sections are designed to be completed quickly; a low score may reflect time pressure rather than lack of understanding. If your child ran out of time, consider practising mental methods and times tables to build speed alongside accuracy.

Worked examples

Whole-number arithmetic, Q1–4, 6, 9, 12–15, 18–20

These questions reward fluent column methods and times-table recall. Marks are lost when children misalign place-value columns (especially in question 1, which yields a six-digit answer) or make single-digit errors in multiplication and addition. Question 4 (answer 20) and question 17 (answer 6) are likely to involve factors, multiples or simple equations; check that the child interprets the question correctly before calculating. Time saved here buys thinking time for harder questions elsewhere.

Q1 : 308520

The product 308520 is the result of a multi-digit multiplication (for example, 514×600 or similar). **Align each partial product carefully**, adding placeholder zeros when multiplying by tens or hundreds. A common error is to drop a zero or misplace a digit, yielding 30852 or 3085200; the answer must have exactly six digits.

Q4 : 20

If the question asks for the highest common factor of two numbers (or a similar divisibility problem), list the factors systematically. **Twenty is a relatively large HCF**, so the original numbers were probably multiples of 20 such as 60 and 100, or 80 and 100. Check your factor pairs to ensure 20 divides both and that no larger number does.

Q14 : 1200

A four-digit answer ending in two zeros suggests multiplication or division involving hundreds. For example, $1200 \div 4 = 300$ reversed gives $300 \times 4 = 1200$. **Write zeros as placeholders** before multiplying to avoid slipping a place value; $12 \times 100 = 1200$, not 120.

Fraction arithmetic, Q5 and Q7

Both answers are proper fractions in lowest terms. **Markers expect the simplest form**—writing $4/6$ instead of $2/3$ will lose the mark even though the values are equal. Common mistakes include forgetting to find a common denominator when adding or subtracting, and failing to cancel at the end. If the question involves mixed numbers, convert to improper fractions first, calculate, then convert back and simplify.

Q5 : $2/3$

The numerator 2 and denominator 3 are coprime, so this fraction is already fully simplified. **If you obtained $4/6$ or $6/9$, divide numerator and denominator by their highest common factor** (2 or 3 respectively) to reach $2/3$. Check your arithmetic: for example, $1/3 + 1/3 = 2/3$, or $5/6 - 1/6 = 4/6 = 2/3$.

Q7 : $21/25$

Twenty-one and twenty-five share no common factors, so $21/25$ is in its simplest form. **If the question required you to add fractions with denominators 5 and 25**, remember that 25 is already a multiple of 5; rewrite the fraction with denominator 5 as an equivalent fraction over 25 before adding. For example, $4/5 + 1/25 = 20/25 + 1/25 = 21/25$.

Decimal arithmetic, Q10, Q11, Q16

Answers must be given to the precision shown—5.04 has two decimal places, 4.5 has one, 2.80 has two (the trailing zero matters if the rubric specifies 'to two decimal places'). **Line up decimal points in column addition and subtraction**; when multiplying, count total decimal places in the factors and place the point accordingly in the product. Losing a zero or misplacing the point by one place is the most common error.

Q10 : 5.04

The zero between the decimal point and the 4 is essential—it holds the tenths place. **If your answer was 5.4, you have lost a place value**; for example, $2.52 + 2.52 = 5.04$, not 5.4. In multiplication, $1.2 \times 4.2 = 5.04$ because there are two decimal places in total (one in each factor).

Q16 : 2.80

The trailing zero indicates the answer is given to two decimal places—probably because the question specified that precision or involved money. **If the rubric says 'give your answer in pounds to the nearest penny', you must write 2.80, not 2.8**. For example, $£1.40 + £1.40 = £2.80$.

Multi-choice or non-numerical answer, Q8

Question 8 has the answer 'C', suggesting a multiple-choice item or a question whose answer is a letter rather than a number. **Read all options carefully before choosing**; in arithmetic papers, such questions often test understanding of place value, rounding, or

properties of number (e.g. 'Which of these is a prime number?'). Eliminate obviously wrong options first, then compare the remaining choices against the question's exact wording.

Q8 : C

Without seeing the question stem, we know only that option C is correct and A, B, D (and possibly E) are not. **In arithmetic contexts, common multi-choice topics include identifying even/odd numbers, recognising multiples, or selecting the correct operation.** Check that your choice satisfies every condition in the question—if the question asks for the smallest solution, verify that options A and B are not smaller than C.

Next steps

Record which questions were incorrect and look for patterns—did your child struggle with a particular operation (e.g. all the fraction questions) or make scattered slips across different topics? **For clustered errors, spend one focused session revising that skill** using a textbook or online resource, then reattempt three or four similar questions to check progress. For isolated mistakes, talk through the working together and ask the child to explain each step aloud; often they will spot their own error.

If the score was strong (16+), move on to the reasoning or problem-solving sections of the paper—arithmetic fluency is a foundation, not the finish line. If time ran short, practise mental methods and times tables daily for two weeks, then retake this section under timed conditions. **Aim for both accuracy and speed**; selective schools expect children to complete arithmetic confidently so that they have ample time for the harder multi-step problems that follow.

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