

St Albans School

12+ Mathematics Specimen

[This specimen paper is intended to give an indication of the level of knowledge expected from candidates. Questions on any particular topic may be easier or more difficult than those in this specimen, and questions requiring logical thinking, without any specific mathematical knowledge, will also be included]

*Calculators are **NOT** permitted in this paper.*

Show all your working, as marks may be awarded for correct methods even if the answer is wrong.

(1)

(a) Write three-fifths as a decimal

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(b) Write $\frac{28}{48}$ as a fraction in its lowest terms

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(c) Write 0.64 as a fraction in its lowest terms.

.....

(d) Write $\frac{3}{8}$ as a percentage

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(2) Write these numbers in order from smallest to largest.

(a) 7, -3, -8, 4, -5

.....

(b) $\frac{3}{8}, \frac{2}{5}, \frac{1}{3}, \frac{5}{6}$

.....

(c) 0.45, $\frac{7}{20}, \frac{2}{5}, 30\%$

.....

(3)

The table shows temperatures at midnight and midday on one day in five cities.

City	Midnight temperature	Midday temperature
Belfast	-3 °C	6 °C
Cardiff	-7 °C	-1 °C
London	1 °C	8 °C
Manchester	-4 °C	1 °C
York	-5 °C	3 °C

(a) Which city had the lowest midnight temperature?

.....

(b) At midnight, how many degrees higher was the temperature in York than Cardiff?

.....

(c) Which city had the smallest rise in temperature from midnight to midday?

.....

(d) Which city had the greatest rise in temperature from midnight to midday?

.....

(4) Calculate the following

(a) $\frac{3}{5} + \frac{3}{4} =$

.....

(b) $1\frac{2}{3} - \frac{3}{5} =$

.....

(c) $2\frac{1}{4} \times \frac{2}{3} =$

.....

(d) $\frac{3}{8} \div \frac{2}{3} =$

.....

(5) (a) Show clearly that

$$132 \times 24 = 3168$$

(b) Use (a) to work out the following:

(i) $3168 \div 12 =$

.....

(ii) $1.32 \times 2.4 =$

.....

(6)

The cost of 5 calculators is £35.

Work out the cost of 8 of these calculators.

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(7) A table tennis club has 160 members. 120 members are male and the rest are female.

(a) Write the ratio of male to female members as a ratio in its simplest form.

.....

(b) The ratio of the number of right-handed members to the number of left-handed members is 9 : 1.

How many of the 160 members are right-handed?

.....

(8) (a) Write each of the numbers in this calculation correct to 1 significant figure.

$$\frac{496 \times 20.4}{51.1}$$

.....

(b) Use your answer to part (a) to work out an approximate value for the answer to the calculation.

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(9)

If $a = 3$, $b = -2$, $c = 4$ and $d = -5$ work out

(a) $a + bd =$

.....

(b) $\frac{a+b}{c-d} =$

.....

(10) The price of a coat costing £60 was first increased by 15% and then reduced by 10%. What is the final price?

.....

(11) Simplify the following

(a) $5x + 2y - 3x + 4y =$

.....

(b) $2ab \times 3a^2b =$

.....

(c) $p^3 \times p^4 =$

.....

(d) $(p^2)^5 =$

.....

(12) Solve the following equations to find x.

(a) $5x = 20$

(b) $\frac{x}{5} = 10$

.....

.....

(c) $8 - x = 3$

.....

(d) $\frac{2}{x} = 4$

.....

(e) $4x - 3 = 7$

.....

(f) $3x - 2 = x + 4$

.....

(13) The number 60 written as a product of prime factors is $2 \times 2 \times 3 \times 5$

(a) Write 126 as a product of prime factors

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(b) Use your answer to (a), without doing any further calculations, to write 1260 as a product of prime factors.

.....

(14) A school has 1100 pupils. 485 of these pupils are girls.

$\frac{2}{5}$ of the girls like sport. $\frac{3}{5}$ of the boys like sport.

Work out the total number of pupils in the school who like sport.

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(15) I drive for 90km at a speed of 60kph and then for 40km at a speed of 80kph

(a) How long does the whole journey take?

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(b) What is my average speed for the whole journey?

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(16) I have three red cards numbered 1, 4 and 5 and three blue cards numbered 2, 3 and 6.

I choose one card of each colour.

(a) List all the possible combinations of numbers that I might pick, entering the results in the table.

Red	Blue
1	2

(b) What is the probability that the number on the red card is more than the number on the blue card?

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(17) A group of 5 people have an average weight of 61kg.

(a) What is the total weight of the group?

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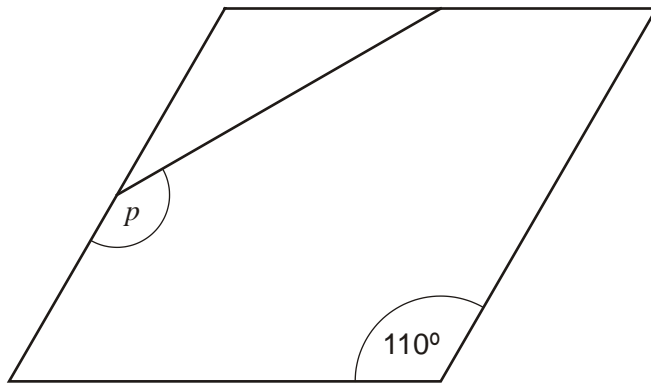
(b) A sixth person weighing 67 kg joins the group. What is the average weight of all six people?

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(c) After a seventh person is included the average is 60kg. What is the weight of the seventh person?

.....

(18) The diagram shows a rhombus. The midpoints of its sides are joined with a straight line.



Not drawn accurately

What is the size of angle p ?

.....

(19) A sequence begins 2, 5, 8, 11,

Assuming this pattern continues, find

(a) the next 3 terms

.....

(b) the 50th term

.....

(20) If A gives B £2 they will have the same amount of money, and if B gives A £2 then A will have twice as much as B.

How much do they each have?

.....

(21) Find the total surface area of a cube which has volume 27cm^3

.....

(22) I have a number of counters which I try to arrange in rows to form a rectangle. When I arrange them in 3 rows or 4 rows I have one counter left over, but I can arrange them in 5 rows exactly. What is the smallest number of counters I can have?

.....

(23) The currency on planet Zlot is Akids. Each Akid is divided into 5 Blims and each Blim into 12 Cwots.

(a) Add together 3 Blims 9 Cwots and 4 Blims 7 Cwots. (Give your answer in Akids, Blims and Cwots)

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(b) What is one-third of an Akid in Blims and Cwots?

.....

(24) (a) complete the following and continue the sequence for five terms.

$$1 \times 3 =$$

$$2 \times 4 =$$

$$3 \times 5 =$$

.....

.....

(b) Similarly continue this sequence for five terms.

$$2^2 - 1 =$$

$$3^2 - 1$$

$$4^2 - 1$$

.....

.....

(c) What do you notice about the sequences?

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(d) Use what you have noticed to work out $99^2 - 1$ **without** working out 99^2 first.

(Show how you have used the pattern)

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