Year 8 Mathematics Examination Preparation Sheet 2018

General Information for Candidates

As in Year 7, the end-of-year assessment in mathematics consists of two one-hour examinations, which will be given equal weighting on your end-of-year report. Paper 1 is a non-calculator paper; paper 2 is a calculator paper. Each paper is worth a total of 72 marks.

You will need a ruler, a blue/black pen, a pencil, an eraser, a protractor and compasses for both papers, and obviously a scientific/mathematical calculator for the second one. (The recommended CASIO FX83GT Plus models are available from your mathematics teacher for £8.)

You will be writing your answers on the question paper in the spaces provided. There will be enough space to set out your method clearly in the way that your teacher has shown you in class. You need to realise that **VERY FEW MARKS WILL BE AWARDED FOR MERELY WRITING DOWN A CORRECT ANSWER WITH NO INDICATION OF METHOD.** We are **not** looking for rough jottings – we want to see that you can follow the procedures and formal mathematical layout that your teacher has shown you during the year. This applies just as much to the calculator paper as to the non-calculator paper.
Here are some revision tips!

(1) **Don't just read through the textbook**! The only way to revise maths is to do maths. You will do much better spending 20 minutes doing maths questions than spending two hours just reading a textbook.
(2) **Use the internet**. You can use mymaths or other videos/websites. However, if you are not strict with yourself you may easily get distracted and not do the work you set out to do.
(3) **Don't just practice the topics you can do.** Unfortunately the test will cover most topics! Although it can be painful, work your way through the topics that you struggle with, because it is much better to struggle on them at home than it is to struggle in the test.
(4) **Make sure you ask for help**. If you are stuck on a topic or a question, then ask one of the people from your class, or your teacher, or someone at home, or look on the internet.
(5) **Practice doing questions under exam conditions**. Get someone to pick you a set of questions from your textbook, or get some from a maths website, and try doing them in silence, with no help, for a fixed amount of time.
(6) **If it works for you, try revising with a friend for a bit of the time**. You will find that one of you understands one topic more, whilst the other is a bit of an expert on another. Just by explaining things to a friend, you will find that your understanding increases, and likewise you might learn a different way of thinking about and understanding a topic.
(7) **Most important of all, try not to worry**. A little worry is not a bad thing as it keeps you focused, but revision certainly shouldn't be a stressful time. It should be a time where your brain gets chance to sort all the information it has been bombarded with and make sense of everything.

If you follow the tips above, you should find that revising for maths (or any other exam) is not that painful! The practice questions below are similar to those you will be expected to answer.

Mr Amlani, King Henry VIII Maths Department, 2018

NON-CALCULATOR PAPER

You must write down all stages in your working. Work out, simplifying your answers,

1. Draw x and y axes from –10 to 10. On the same axes, draw and label the following graphs:
(a) $y = 3x + 1$ (b) $y = 3x - 1$ (c) $y = 1 - 3x$ (d) $y = x + 3$
For each graph, state the gradient and the y-intercept.

2. A straight line passes through the points (0, 5) and (3, 11).
Work out the gradient of the line and write down its equation. (You do not need to draw the line.)

3. Put the following in order of size, starting with the smallest:
$7.3 \div 0.1$ 7.3×0.001 7.3×1000 $7.3 \div 0.01$ $7.3 \times \frac{1}{10}$ $7.3 \div 100$

4. A teacher is planning a walk with his tutor group, from Coventry to Leamington. On the map, with a scale of 1:300 000, the distance between Coventry and Leamington is measured as 3cm. What is the real distance between Coventry and Leamington, in km?

5. In the diagram on the right, PQ is a straight line.

(a) (i) Work out the size of the angle marked $x°$.
(ii) Give a reason for your answer.

(b) (i) Work out the size of the angle marked $y°$.
(ii) Give a reason for your answer.

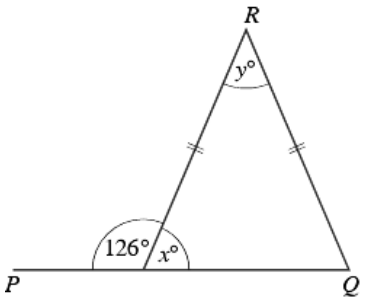


Diagram **NOT** accurately drawn

6. Convert these numbers (a) to standard form (i) 120 000 000 (ii) 103 000 (iii) 0.000989
(b) to an ordinary number (i) 3.2×10^5 (ii) 1.05×10^6 (iii) 7.54×10^{-6}

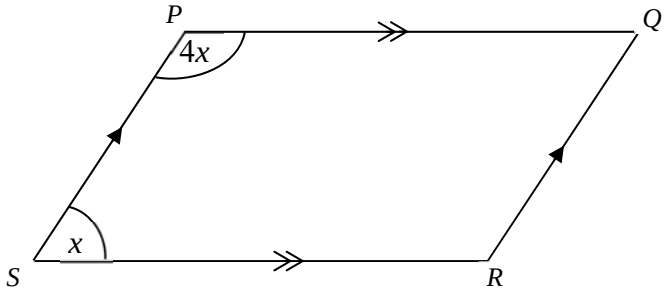
7. Simplify:
(a) $3g - 5q - 2g + q$ (b) $v \times 3 \times u \times v$ (c) $2z^2 + 5s^2 - s^2 + z^2$ (d) $2 \times i \times j \times i \times i$

8. Factorise fully:
(a) $24 + 8y$ (b) $9p - 3$ (c) $2w + 48$ (d) $36v - 8$

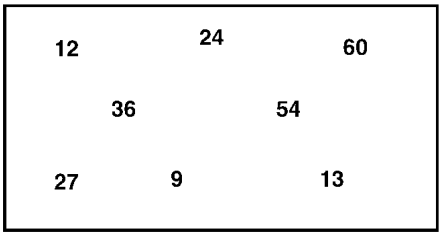
9. Expand:
(a) $5(6 - b)$ (b) $8(2s + 5)$ (c) $10(3q - 1)$ (d) $-3(t - 4)$
(e) $p^2(q^2 + p^3)$ (f) $abc(b^2 - a^3)$

10. Expand and simplify:
(a) $4(2 - 6h) + 3(h + 1)$ (b) $3(2u + 7) - 2(5 - u)$

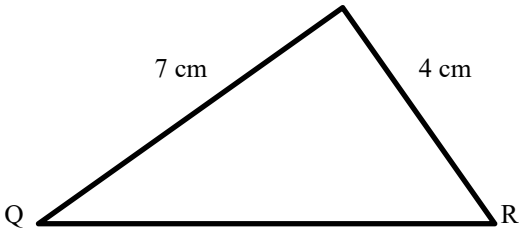
11. $PQRS$ is a parallelogram.
Angle PSR is $x°$. Angle QPS is $4x°$.
(a) Form an equation involving x.
(b) State which angle facts you have used.
(c) Solve your equation to find x.
(d) State the values of the four angles in the parallelogram.



12. From the numbers in the rectangle, write down all of the
(a) odd numbers
(b) numbers that are factors of 72
(c) numbers that are multiples of 9
(d) prime numbers



13. Look at the diagram on the right.
It is **not** drawn accurately.
(a) Use your geometry instruments to make an accurate drawing of the triangle.
(b) Measure the size of angle Q on your accurate drawing and write it down.



14. What is the missing fraction in the sequence below?

$\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \mathbf{?}, \frac{1}{2}$ Explain your answer clearly.

15. Work out:

(a) $20 - 7 \times 2 - 3$ (b) $\dfrac{3 \times 6^2}{6 - 2}$ (c) $\dfrac{10 - 4}{3 \times 2^2}$ (d) $18 - 6 \div 3 - 2 + 1$

16. Work out:

(a) $349 + 257$ (b) $503 - 78$ (c) $51 - 34.547$ (d) 686×57

(e) 1.36×9.5 (f) $3.05 \div 2.5$ (g) $21.352 \div 3.4$ (h) $39.732 \div 6.6$

17. Work out:

(a) $30 \times (-4)$ (b) $(-16) + (-25)$ (c) $(-45) \div (-15)$ (d) $(-5) \times 3$ (e) $8 - (-15)$

18. Work out, leaving your answers in their simplest forms,

(a) $\dfrac{7}{9} \times \dfrac{3}{55} \times \dfrac{11}{14}$ (b) $\dfrac{2}{5} + \dfrac{1}{3} - \dfrac{1}{6}$ (c) $5\dfrac{5}{8} - 1\dfrac{1}{3}$ (d) $1\dfrac{5}{6} - \dfrac{8}{9}$ (e) $\dfrac{16}{3} \times \dfrac{5}{6} \div \dfrac{8}{9}$

19. One letter is chosen at random from the word CALCULATOR. What is the probability that it is

(a) a letter R (b) a letter C (c) a vowel (d) a letter D ?

20. Simplify fully:

(a) 32 : 8 : 12 (b) 5 days : 1 year (c) 25 mm : 1 m (d) 1.2 litres : 40 cm^3

21. Use the values $a = 1$, $b = -2$, $c = 3$ and $d = -3$ to work out:

(a) $3a + 5b - c$ (b) $3ab + c^2$ (c) bd^c (d) $4c(a + 3b)$

22. Solve the equations:

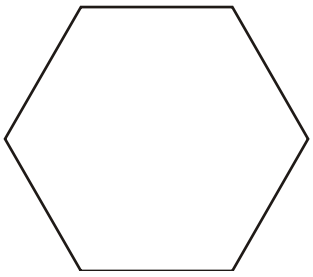
(a) $5r - 7 = 68$ (b) $5(h + 2) = 3h$ (c) $3(u + 5) - 1 = 5u + 2$ (d) $38 - 4y = 10$

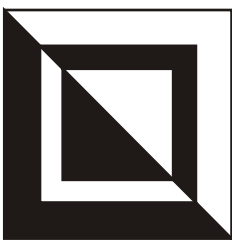
(e) $\frac{3(x-5)}{4} = 9$ (f) $\frac{2}{3}(y - 2) = y + 5$

23. Find both values of x for which $x^2 = 16$ (ie solve $x^2 = 16$). Now solve $5x^2 = 20$.

24. Rearrange the formula $s = \frac{1}{2}at^2$ to make a the subject.

25. Look at the shapes below. They **are** drawn accurately.





(a) How many lines of symmetry does each one have?

(b) What are their orders of rotational symmetry?

26. A linear sequence begins at –5 and each term is 9 more than the previous term.

(a) What is the 4th term?

(b) Find an expression for the n^{th} term.

27. A sequence is defined by the formula: n^{th} term = $20 - n^2$

Work out the first five terms.

28. Draw x and y axes from –6 to 6.
Plot the points A (–1, 1), B (–2, 1) and C (–2, 3) and join them to make the triangle P.
(a) Reflect P in the line $x = 2$ and label the image Q.
(b) Rotate P 180° about the point (1, 1) and label the image R.

CALCULATOR PAPER

Remember: "If you type it in your calculator, write it in your book"

29. Use your calculator to evaluate $\dfrac{62 \times 715}{5.4 - 1.93}$.
(i) Write down all the figures on your calculator display.
(ii) Now round your answer to 2 decimal places and write it down.

30. (a) Work out (i) $\frac{3}{8}$ of £43.36 (ii) 24% of 65 litres
(b) Change $\frac{5}{8}$ into (i) a decimal (ii) a percentage
(c) Express 48% as (i) a decimal (ii) a simplified fraction

31. (a) Express the following numbers as products of their prime factors:
(i) 60 (ii) 96
(b) Use your prime factorisations to find the **Highest Common Factor (HCF)** of 60 and 96.
(c) Use your prime factorisations to find the **Lowest Common Multiple (LCM)** of 60 and 96.

32. The **surface area** of a cube is 24 cm². Find what each length of the cube is, and work out the **volume** of the cube.

33. In the diagram, PST is a straight line.

(a) (i) Work out the size of the angle marked x.
(ii) Give a reason for your answer.

(b) (i) Work out the size of angle SPQ.
(ii) Give a reason for your answer.

(c) (i) Work out the size of angle PQS.
(ii) Give a reason for your answer.

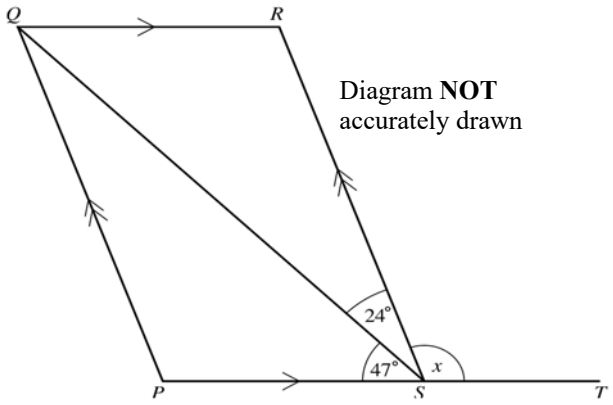
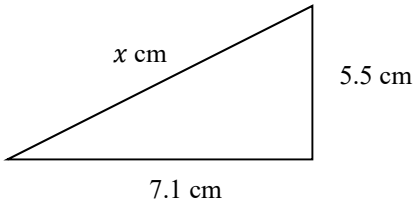
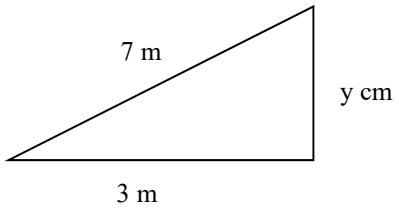


Diagram **NOT** accurately drawn

34. Write these distances in order of size, starting with the **smallest**.
A: 10.5 feet B: 124.5 inches C: 3.25 m D: 10 feet 5 inches
Which two distances are **closest** in size? Explain your answer clearly.

35. Find the missing lengths in these triangle (answers to 2dp). They are NOT to scale.





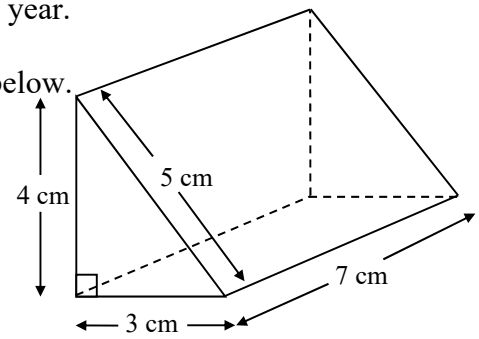
36. Poppy decides to share 60 biscuits between Angela and Ella in the ratio of the numbers of letters in their names. How many biscuits do they both get each?

37. To make a pizza, Julia uses cheese, topping and dough in the ratio 2:3:5.
She uses 70 grams of dough. How much cheese and topping will she need?

38. Charlie and Alice each think of a number and whisper it to Toby.
Toby says that 3 lots of Charlie's number added to 5 lots of Alice's number makes 214.
(a) Write an equation to express this, using ***c*** for Charlie's number and ***a*** for Alice's number.
Alice knows that her number is –52.
(b) Substitute –52 for ***a*** and get an equation containing ***c*** as the only letter.
(c) Solve the equation to find Charlie's number, ***c***.

39. Using the formula $d = \frac{2h}{21}$, you can work out how old you are in 'dog years'.
In this formula, d is the dog age (in years) and h is the human age (in years).
(a) Work out the **dog age** for a 5-year-old child.
Give your answer in months, correct to the nearest month.
(b) Work out the **human age** for an 18-month-old puppy.
Give your answer in years, correct to the nearest year.

40. (a) Calculate the **volume** of the right prism shown below.
(b) Calculate the **surface area** of the prism.



41. (a) How many square centimetres are there in a square metre?
(b) How many square inches are there in a square foot?

42. Are there more seconds in a year or hours in a thousand years?
Explain your answer clearly.

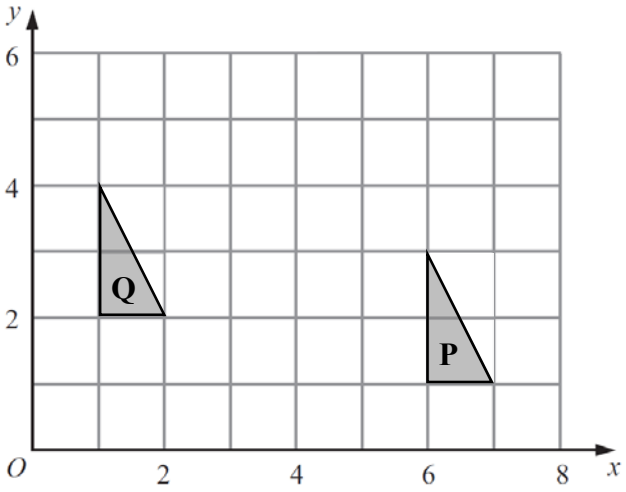
43. Here are Esher's last 10 mathematics homework marks:

5, 7, 7, 5, 7, 11, 5, 11, 7, 11

(a) Write down the modal mark.
(b) Work out the median mark.
(c) Work out the range of the marks.
(d) Work out the mean mark.

44. (a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

(c) Plot the points (1,5) and (5,2). Construct the perpendicular bisector of these points. Does the line pass through the point (1,1)?



45. Kian scored 21 out of 24 in a mathematics test. What is this as a percentage?

46. Copy and complete this table to help plot the curve $y = x^2 - 3x - 4$.
You do not need to use the middle three rows, if they are not helpful to you (remember you can use the table function on your calculator)! Draw the x -axis from –3 to +6 and the y-axis from -7 to +15.

x	–3	–2	-1	0	1	2	3	4	5	6
x^2										
$-3x$										
-4										
y			0				-4			

47. Draw x and y axes from –5 to 5. Plot the points A (5, 2) and B (–1, –3) and join each of them to the origin O, making the lines OA and OB. Use ruler and compasses to construct the angle bisector of the angle AOB.
Does the angle bisector pass through the point (2, –2)?

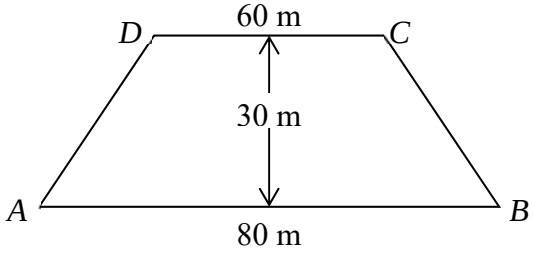
48. Kevin conduct a survey with his friends they have to choose which of the options is their favourite thing to do. Fill in the rest of the frequency column and draw a pie chart to display the data.

Favourite Past time	tally	frequency
Playing Minecraft	𝍸 I	6
Watching TV	II	2
Playing Sports	𝍸 II	
Reading books	𝍸	
Listening to music	IIII	

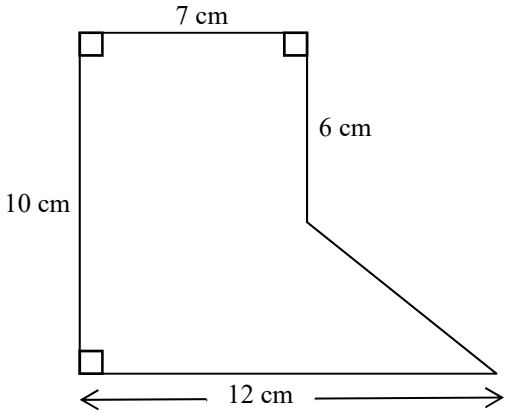
49. Sami opens a savings account and puts in £80.
Interest of 1.5% is added at the end of each year. Work out how much money is in Sami's account after two years if no money is taken out.

50. Calculate the area of the pentagon on the below (right).

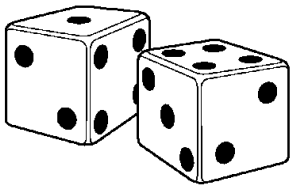
51. In the shape below (left), AB is parallel to CD and the distance between the parallel lines is 30 m. Calculate the area of the shape.



Diagrams **NOT** accurately drawn



52. Sophie rolls two ordinary unbiased dice.
Her score is the **mean** of the scores showing on the top faces.
For example, the score on the dice in the picture is $\frac{1+4}{2} = 2.5$.



(a) Draw a sample space diagram showing all the possible outcomes.
(b) Work out the probability that the score will be
(i) more than 4 (ii) less than 5 (iii) more than 4 **and** less than 5.

53. A pizza has a **diameter** of 10 inches.

(a) Find the area of the top of the pizza.
(b) It has a 'stuffed crust'. Find the circumference of the pizza.
State your units with the answers.

54. A (1, –2), B (–1, 2) and C (3, 4) are the vertices of a square $ABCD$.
Draw a pair of axes and plot these points.
Write down (a) the coordinates of D (b) the coordinates of the **mid-point** of AC.

55. Decide if the triangles in each of these shapes are *congruent*. If so, which rule did you use?
(a) (b)