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National 4 Mathematics

Q&A Booklet:
Key Facts to Memorise

Ways of using this booklet:

1) Write the questions on cards with the answers on the back and **test yourself**.
2) **Work with a friend** who is also doing National 4 Maths to take turns reading a random question and answering.
3) **Ask a friend or family member**** to test you by reading questions (on the left-hand side) to you.

The questions are on the left-hand side of each page and the answers are on the right.

If the person who is testing you has not done National 4 level maths topics recently (or ever!), they may need some help reading the maths symbols, so some mathematical symbols have been written out phonetically **(in a smaller bold underlined font) to help them.

Questions with a grey background are also repeated on the formula sheet, but it is still a good idea to memorise them ahead of tests.

General Skills	
1) What two things do you need to include when a question asks you to '**explain your answer**' (or '**justify your answer**' or '**give a reason**')?	Two numbers and a comparing word.
2) When a question asks you to round your answer, what do you have to remember?	Write the unrounded answer as well as the rounded one.

Numeracy Outcome 1: Measurement	
3) How many **centimetres** are in a **metre**?	100
4) How many **metres** are in a **kilometre**?	1000
5) How many **millimetres** are in a **centimetre**?	10
6) How many **grams** are in a **kilogram**?	1000
7) How many **millilitres** are in a **litre**?	1000
8) How many **centimetres cubed** are in a **litre**?	1000

Numeracy Outcome 1: Speed, Distance and Time	
9) What is the formula for **speed**?	$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$ (or $S = \frac{D}{T}$)
10) What is the formula for **distance**?	$\text{Distance} = \text{Speed} \times \text{Time}$ (or $D = ST$)
11) What is the formula for **time taken**?	$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$ (or $T = \frac{D}{S}$)
12) How do you write **15 minutes** in hours using a decimal point?	0·25
13) How do you write **45 minutes** in hours using a decimal point?	0·75
14) What is **0·1 hours** in minutes?	6 minutes
15) How do you write **6 minutes** in hours using a decimal point?	0·1
16) How do you change minutes into hours using a decimal point?	Divide by six and write the answer after the point
17) How do you change hours (with a decimal point) into minutes?	Multiply the number after the point by six

Numeracy Outcome 1: Fractions and Percentages	
18) How do you calculate a **fraction**?	Divide by the bottom and times (multiply) by the top
19) What do you divide by to work out **25%**?	4
20) What do you divide by to work out **10%**?	10
21) What sum do you do to work out **75%**?	Divide by 4 and times by 3 ***Alternative answer:*** find three-quarters
22) What do you do to work out **30%** <u>without</u> a calculator?	Divide by 10 and times by 3 ***Alternative answer:*** find 10% and times by 3
23) What sum do you do to work out **70%** <u>without</u> a calculator?	Divide by 10 and times by 7 ***Alternative answer:*** find 10% and times by 7
24) What sum do you do to work out **3%** <u>without</u> a calculator?	Divide by 100 and times by 3 ***Alternative answer:*** find 1% and times by 3
25) What sum do you do to work out **5%** <u>without</u> a calculator?	Divide by 100 and times by 5 ***Alternative answer:*** find 1% and times by 5 ***Alternative answer:*** find 10% and half it
26) How do you work out a percentage <u>with</u> a calculator?	***either*** change to a decimal and multiply ***or*** divide by 100 and multiply

Numeracy Outcome 2: Graphs and Probability	
27) What is the probability of something **impossible**?	Zero
28) What is the probability of something **certain**?	One **Alternative answer:** 100%
29) How can you decide which probability is most likely?	Change all probabilities to a percentage and choose the largest one.
30) How do you change a probability from a fraction to a percentage?	Top number divided by bottom number multiplied by 100.

Expressions and Formulae 1.1: Algebra	
31) What does **evaluate** mean?	Do the sum
32) What does **factorise** mean?	Put the brackets back in
33) When writing a formula from a table of values, how do you find the number you multiply by?	Look at the bottom row of the table and identify the number you are 'going up' in
34) How do you calculate a **gradient**?	Vertical distance divided by horizontal distance

Expressions and Formulae 1.3: Graphs, Charts, Tables and Statistics	
35) If you are asked to draw a **frequency table**, what does this mean?	A tally chart.
36) What two things do you need to remember when drawing a frequency table?	1) Three columns: description, tally, frequency 2) Headings for columns
37) How do you calculate the angles needed for a pie chart?	360 divided by the 'total' multiplied by the frequency for that 'slice'
38) How do you find the **range**?	Highest take away Lowest
39) How do you find the **mode**?	The most frequent number
40) How do you find the **median**?	The middle number
41) What do you have to do <u>before</u> you can find the median?	Put the numbers in order
42) How do you find the **mean**?	a) Add all the numbers together b) Divide by how many numbers there are
43) If a <u>mean, median or mode</u> is **higher**, what comment can you make?	On average the numbers are higher
44) If a <u>mean, median or mode</u> is **lower**, what comment can you make?	On average the numbers are lower
45) If a <u>range</u> is **higher**, what comment can you make?	The numbers are more **varied**
46) If a <u>range</u> is **lower**, what comment can you make?	The numbers are more **consistent**

Numeracy/Expressions and Formulae 1.2:
Areas and Volumes

47) When do you use **squared units** e.g. centimetres squared (cm^2) or metres squared (m^2)?	When you are working out an area **Alternative answer:** when the formula begins "$A =$"
48) When do you use **cubed units** e.g. metres cubed (m^3) or centimetres cubed (cm^3)?	When you are working out a volume **Alternative answer:** when the formula begins "$V =$"
49) How do you find the area of a **rectangle**?	"Length times Breadth" **Alternative answer:** $A = LB$
50) How do you find the area of a **triangle**?	"Half Base times Height" **Alternative answer:** $A = \frac{BH}{2}$ **(A equals BH over 2)**
51) How do you find the volume of a **cuboid**?	"Length times Breadth times Height" **Alternative answer:** $V = LBH$
52) What is the formula for the **area** of a circle?	$A = \pi r^2$ **(A equals pi r squared)**
53) What is the formula for the **circumference** of a circle?	$C = \pi d$ **(C equals pi d)**
54) What are the three steps to find the **surface area** of a cuboid?	1) Find the area of the three rectangles 2) Add them together 3) Double your answer
55) How do you find the **perimeter** of a shape with curved sides?	Use $C = \pi d$ for the curved length and then add on any straight lengths
56) If you are told the radius, how do you find the **diameter** of a circle?	Double it
57) If you are told the diameter, how do you find the **radius** of a circle?	Half it
58) How do you find the area of a **semicircle**?	Find the area of a circle and then half it **Alternative answer:** $A = \frac{\pi r^2}{2}$ **(A equals pi r squared over 2)**
59) How do you find the volume of a **prism**?	a) Find the area of the end (cross-section) b) Multiply by the height
60) What is the formula for the volume of a **cylinder**?	$V = \pi r^2 h$ **(V equals pi r squared h)**

Relationships 1.1: Equations and Straight Line Graphs

61) What is the key rule for solving **equations**?	Move to the other side and do the opposite
62) If a straight line is **horizontal** through the number a, how do you write its equation?	$y = a$
63) If a straight line is **vertical** through the number b, how do you write its equation?	$x = b$

Relationships 1.2: Pythagoras and Angles

64) What are the three steps involved in a **Pythagoras** question?	1) Square 2) Add or take away 3) Square root
65) When do you choose to **add** in a Pythagoras question?	If the side you are finding is the longest one
66) When do you choose to **take away** in a Pythagoras question?	If the side you are finding is a shorter one
67) On a test paper, what phrase might be a clue to use Pythagoras?	"Do not use a scale drawing"
68) What do the three angles in a **triangle** always add up to?	180 degrees
69) What do the four angles in a **quadrilateral** always add up to?	360 degrees
70) What is a tangent to a circle?	A line that just touches the edge of the circle at one point
71) When you have a circle diagram including a tangent, what can you say about angles?	The angle between the tangent and the radius is a right angle
72) What do you know about the angle in a semicircle?	It is a right angle
73) In which two places can you find right angles in circle diagrams?	1) Between a tangent and radius 2) Angle in a semicircle

Relationships 1.3: Trigonometry (SOH CAH TOA)	
74) On a test paper, what phrase might be a clue that you have to use either Pythagoras or SOH CAH TOA?	"Do not use a scale drawing."
75) If a question has the **opposite** and **hypotenuse**, do you use sin **(pronounced sine)**, cos or tan?	sin
76) If a question has the **adjacent** and **opposite**, do you use sin **(pronounced sine)**, cos or tan?	tan
77) If a question has the **hypotenuse** and **adjacent**, do you use sin **(pronounced sine)**, cos or tan?	cos
78) What is the formula for **tan**?	$\tan x = \frac{\text{opposite}}{\text{adjacent}}$ **(tan x equals opposite over adjacent)**
79) What is the formula for **sin**? **(pronounced sine)**	$\sin x = \frac{\text{opposite}}{\text{hypotenuse}}$ **(sine x equals opposite over hypotenuse)**
80) What is the formula for **cos**?	$\cos x = \frac{\text{adjacent}}{\text{hypotenuse}}$ **(cos x equals adjacent over hypotenuse)**
81) When do you use the SHIFT button on the calculator in a SOH CAH TOA question?	To calculate an angle
82) A SOH CAH TOA question asks you to find the angle: what are the two main steps?	1) Divide 2) Use shift (or inverse) sin/cos/tan
83) A SOH CAH TOA question asks you to find a length: what are the two main steps?	1) Multiply by the number on the bottom 2) Use normal sin/cos/tan
84) How do you know whether to use SOH CAH TOA or Pythagoras?	If there is an angle in the question, you use SOH CAH TOA. If its only lengths, you use Pythagoras.

Relationships 1.4: Scatter Graphs	
85) Does a line of best fit need to go through the origin?	No
86) If a question asks you to 'estimate' what do you do?	Use your line of best fit to read off the graph

Whole Course: Choosing the correct Method	
87) If a question has a **circle** in, and isn't about angles, what do you need to do to get most of the marks?	Use either $A = \pi r^2$ or $C = \pi d$ **(A equals pi r squared or C equals pi d)**
88) If a question contains the phrase "**do not use a scale drawing**", which two topics might it be?	1) Pythagoras 2) SOH CAH TOA
89) If a question asks you to **solve algebraically**, what do you have to do?	Move things from one side to the other and do the opposite (and if you don't, you'll get zero marks even if you have the right answer)
90) If a question asks you to calculate a (straight) distance or length, which two topics might it be?	1) Pythagoras 2) SOH CAH TOA