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National 4
Applications of 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 Applications 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.

Managing Finance and Statistics: Graphs and Statistics	
31) If you are asked to draw a **frequency table**, what does this mean?	A tally chart
32) What two things do you need to remember when drawing a frequency table?	1) Three columns: description, tally, frequency 2) Headings for columns
33) What three things do you need to remember when drawing a bar chart?	1) Scale up the side with an overall label 2) Gaps between each bar 3) Each bar labelled
34) How do you find the **range**?	Highest take away Lowest
35) How do you find the **mode**?	The most frequent number
36) How do you find the **median**?	The middle number
37) What do you have to do before you can find the median?	Put the numbers in order
38) How do you find the **mean**?	a) Add all the numbers together b) Divide by how many numbers there are
39) If a <u>mean, median or mode</u> is **higher**, what comment can you make?	On average the numbers are higher
40) If a <u>mean, median or mode</u> is **lower**, what comment can you make?	On average the numbers are lower
41) If a <u>range</u> is **higher**, what comment can you make?	The numbers are more **varied**
42) If a <u>range</u> is **lower**, what comment can you make?	The numbers are more **consistent**
43) In a scatter graph, does a line of best fit need to go through the origin?	No
44) If a scatter graph question asks you to 'estimate' what do you do?	Use your line of best fit to read off the graph
45) How do you calculate the angles needed for a pie chart?	360 divided by the 'total' multiplied by the frequency for that 'slice'

Managing Finance and Statistics: Finance	
46) What does **income** mean?	The money you get in
47) What does **expenditure** mean?	The money you spend
48) What sum do you do with income and expenditure to work out how much money is left over?	Income take away expenditure
49) In a money question, what is the **balance**?	The money left over
50) How do you work out how much somebody gets paid when you know how many hours they have worked?	Hourly pay × number of hours
51) If you get **time-and-a-half** for overtime, what do you multiply the pay by?	1·5
52) If you get **double time** for overtime, what do you multiply the pay by?	2
53) Give an example of a **deduction** from pay?	Tax, National Insurance, Pension etc.
54) What does **gross pay** mean?	The amount you get paid before deductions are taken off
55) What does **net pay** mean?	The amount you get paid after deductions are taken off
56) How do you work out net pay?	Take the Deductions away from the Net Pay
57) How do you find **monthly instalments** on a loan?	a) Calculate the interest as a <u>percentage</u> b) <u>Add</u> on the interest to the original amount c) <u>Divide</u> by the number of months
58) When using exchange rates, how do you decide whether to **multiply** or **divide**?	Multiply when changing into foreign money, divide when changing back into pounds.

Geometry and Measures: Areas and Volumes	
59) When do you use **squared units** e.g. centimetres squared (cm²) or metres squared (m²)?	When you are working out an area **Alternative answer:** when the formula begins "$A =$"
60) When do you use **cubed units** e.g. metres cubed (m³) or centimetres cubed (cm³)?	When you are working out a volume **Alternative answer:** when the formula begins "$V =$"
61) How do you find the area of a **rectangle**?	"Length times Breadth" **Alternative answer:** $A = LB$
62) How do you find the area of a **triangle**?	"Half Base times Height" **Alternative answer:** $A = \frac{BH}{2}$ **(A equals BH over 2)**
63) How do you find the volume of a **cuboid**?	"Length times Breadth times Height" **Alternative answer:** $V = LBH$
64) What is the formula for the **area** of a circle?	$A = \pi r^2$ **(A equals pi r squared)**
65) What is the formula for the **circumference** of a circle?	$C = \pi d$ **(C equals pi d)**
66) 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
67) If you are told the radius, how do you find the **diameter** of a circle?	Double it
68) If you are told the diameter, how do you find the **radius** of a circle?	Half it
69) 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)**
70) How do you find the volume of a **prism**?	a) Find the area of the end (cross-section) b) Multiply by the height
71) What is the formula for the volume of a **cylinder**?	$V = \pi r^2 h$ **(V equals pi r squared h)**

Geometry and Measures: Pythagoras and Gradient	
72) What are the three steps involved in a **Pythagoras** question?	1) Square 2) Add or take away 3) Square root
73) When do you choose to **add** in a Pythagoras question?	If the side you are finding is the longest one
74) When do you choose to **take away** in a Pythagoras question?	If the side you are finding is a shorter one
75) On a test paper, what phrase might be a clue to use Pythagoras?	"Do not use a scale drawing"
76) How do you calculate a gradient?	Vertical distance divided by horizontal distance

Geometry and Measures: Container Packing, Scale Drawings	
77) What two things do you need to remember when drawing or measuring a **three-figure bearing** on a diagram?	1) Must start with zero at North 2) Must measure clockwise
78) From a real-life situation, how do you find the length to draw in a scale drawing?	Divide by the number in the scale
79) From a scale drawing, how do you find the real-life length?	Multiply by the number in the scale
80) How do you work out how many items can 'fit in' to a given space?	1) Divide total length ÷ smaller length 2) Round the answer down to the nearest whole number
81) What are the two steps to pack containers using the **first-fit algorithm**?	1) Take each item in the order given 2) Put it in the first container that has enough space left

Whole Course: Choosing the correct Method	
82) If a question has a **circle** in, what do you need to do to get most of the marks?	Use either the formula $A = \pi r^2$ or $C = \pi d$ **(A equals pi r squared or C equals pi d)**
83) If a question contains the phrase "**do not use a scale drawing**", which topic could it be?	Pythagoras
84) If a question asks you to calculate a diagonal length, what topic is it likely to be?	Pythagoras
85) For a question involving a rectangle, how do you decide whether to use $A = LB$ to add the lengths?	If the question is asking for the area use $A = LB$. If it wants the length around the outside, add the lengths.
86) For a question involving a triangle, how do you decide whether to use $A = \frac{BH}{2}$ **(A equals B H over 2)** or Pythagoras?	If the question is asking for the area use $A = \frac{BH}{2}$. If it wants the length of an edge, use Pythagoras.