**Maths for Psychology pack**

**![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\LFCTX1KH\i_love_maths[1].png]()**

At least **10%** of your marks in Psychology exams will require you to use your mathematical skills. You shouldn’t be afraid of this but see it as an opportunity to gain easy marks as a lot of the maths you will have already covered at GCSE and the rest we’ll cover with you.

We want you to come to your first lesson feeling confident about the maths and this pack will help you to do that.

****We’ll be giving you a maths test in the first few lessons so we know where you’re at which will help us to help you in the coming year.

Scan the QR code to go to the Psychology specification to see this in more detail. Don’t have a smart phone? Don’t worry all the information linked to QR codes in this pack are available on our website-**www.psych205.com**

**What maths do I need to know in the first year?**

1.Calculating percentages

2. Percentages to decimals

3. Fractions

4. Using ratios

5. Estimating results

6 Interpreting mathematical symbols

7. Measures of central tendency-mean, median, mode

8. Measures of dispersion-range (standard deviation)

**What do you need to do before your first Psychology lesson in September?**

1. Fill in the first column of the table below to find out what you think you know and don’t know.

2. If you have scored 5’s for all areas then you need to do the 3 mini quizzes in the pack to check you really have got this. If you are getting them all correct then write in your score below and you are ready. However you may want to try the extra extension questions, the standard deviation extension activity or start to look at the second year statistics to really extend your learning.

3. If you have scored less than 5’s on any of the sections then you need to work through the relevant sections and complete the questions when you think you are ready to.

4. Go back to the table after completing the pack and all the questions and add in your scores for the tests and now rate your confidence. Hopefully they are now all 4’s and 5’s. Remember you will have a test in the first week back on all this and will be asked to do these calculations in lessons throughout the year so make sure you are ready.

5. Still need more practice, want to be sure of doing well in the test at the start of term? Try the extra questions at the end of the pack.

**So what do you know already?**

 **5**-I’ve got this! Easy peasy **1**-I’m totally clueless, no idea!

**![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\CYCAANG8\sad-face[1].jpg]()**![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\LFCTX1KH\happy-face-770659[1].png]()

|  |  |  |  |
| --- | --- | --- | --- |
|  | How confident are you with the following areas of maths before completing the pack? | How confident are you after completing the pack? | Scores on mini test for each section |
| 1. Calculating percentages |  |  |  |
| 2. percentages to decimals |  |  |  |
| 3. Fractions  |  |  |
| 4.Using ratios |  |  |
| 5.Estimating results |  |  |
| 6.Interpreting mathematical symbols |  |  |  |
| 7.Measures of central tendency-mean, median, mode |  |  |
| 8. Measures of dispersion-range,(standard deviation) |  |  |

**Why maths? I thought I was studying Psychology!**

So why are we making you do maths? When an investigation is conducted data is collected and the process of turning that data into information is called data analysis. Maths is important if the data is quantitative (numerical data that can be counted) as it can be used to show us important things like what the average scores in an experiment are or how spread out the scores are, or if the experiment worked or not. Qualitative data (data expressed in words) can also be turned into quantitative data and so maths is needed here again.

![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\LZV48CVV\calculator-pink-clipart[1].jpg]()

You can use a calculator in the exam but you must show your workings or lose marks.

**1. Calculating percentages**

'Percent' means 'out of 100'. If 90 per cent of the population owns a mobile phone, we are simply saying that 90 out of every 100 people have one. The symbol '%' means per cent.

**Finding percentages**

A percentage is a fraction of 100.

**30%** (30 in each 100) as a fraction is 30/100

**30%** as a decimal is **0.3**.

However it’s unlikely we’ll have a nice convenient 100 people in our sample so we need a way to convert scores to percentages.

**How to express a number as a percentage**

For example in a class of 96, 60 passed a recent test. What percentage of students then passed the test i.e. express 60 as a percentage of 96?

**Step one**-divide the number of students who passed (or number you want expressed as a percentage) by the total number of students

60/96

**Step two**-multiple this by 100 to make it into a percentage.

60/96 x 100= 62.5%

**How to find a percentage of a quantity.**

For example a student got 40% on a test out of 50, what was her score?

**Step one**- First; write the percentage as a fraction or a decimal,

40/100

**Step two**- then multiply by the quantity.

40/100 x 50= 20 ans

**![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\LFCTX1KH\math[1].jpg]()Show your workings out!!**

In the exam you get marks for your working out so you must write down the answer step by step or lose marks. You also must work out the answer using the above formula and not try to work out 1% then 10% etc. as it takes longer and you won’t get full marks.

There may be various different ways these questions can be asked and made more complicated so now try the questions below.

 **Scan here for test answers**

**Mini test one**

Once you have completed each mini test scan the QR code above, mark you answers and put your score into the table. If some answers were incorrect look over the area again and redo the question until you get it right. Remember you get marks for your workings!

**There were a total of 2625 students studying at BHASVIC this academic year, 350 were studying first year Psychology (AS) and 280 were studying second year (A2) Psychology.**

1. What percentage of students at BHASVIC studied Psychology this year? (3 marks)

2. What percentage of students at BHASVIC, this year, were on the first year of the Psychology course? (2 marks)

3. What percentage of students at BHASVIC were studying on the second year? (2 marks)

4. What percentage of all students on Psychology courses at BHASVIC this year were on the second year course? (3 marks)

5. 95% of all students studying Psychology this year said that they enjoyed the course so how many students said that they didn’t enjoy Psychology? (2 marks)

6. 32% of the second year students who studied Psychology this year said that they will be studying Psychology at university next year. How many students is this? (2 marks)

Total- /14

**2. Converting percentages to decimals**

This is nice and easy!

**Step one**- to convert a percentage to a decimal. Remove the % sign and move the decimal point two places to the left.

For example: 37% is 37.0 then move the decimal point two places to the left which is 0.37 and 9% is 0.09.

**3. Fractions**

A fraction is part of a whole number such as ½ or ¾. You may want to present results from a study as a fraction.

For example, if there were 120 participants and 40 of them took part in condition A of an experiment then what fraction is this?

**Step one**-Divide 40 by 120= 40/120 (write it like this, don’t actually divide it)

**Step two-**Reduce the fraction by dividing both numbers by the lowest common denominator (i.e. the lowest number that divided them both equally). In this case it is 40. So the answer is 1/3

**Converting a decimal to a fraction**

**Step one**- First you need to work out the number of decimal places in your number i.e. how many digits after the decimal point. For example, 0.1 has one decimal place, 0.49 has two decimal places and 0.275 has three decimal places.

**Step two-**If there are two decimal places then you divide by 100, if there are three decimal places then you divide by 1,000 (the number of decimal places equals the number of zeros).

So to convert to fractions you get: 49 and 275

 100 1000

**Step three-**You can reduce the fraction by finding the **lowest common denominator** (the biggest number that divides evenly into both parts of the fraction).

In the case of 275/1000 you can divide both by 25 and get 7/40. Even if the question doesn’t ask for it you must find the lowest common denominator for full marks.

**Converting a fraction to a percentage**

So how would you change 19/36 into a percentage?

**Step one-**divide the numerator by the denominator (i.e. the top by the bottom)

 19 divided by 36= 0.52777778

**Step two-** To make this a percentage you multiply by 100 by moving the decimal place two places to the right. So the answer is 52.8% (if to three significant figures).

**4. Using ratios**

A **ratio** says how much of one thing there is compared to another thing. Betting odds are given in ratios. For example 4 to 1 (4:1) meaning that out of a total of five events you would be expected to lose four times and win once.

There are two ways to express a ratio. Either the way above, this is called a **part-to-part** ratio. Or we can have a **part-to-whole** ratio, which would be expressed as 4:5, meaning four losses out of five occurrences.

A part-to-whole ratio can easily be changed to a fraction 4:5 is 4/5

Ratios can be reduced to a lowest form in the same way that fractions are, so 10:15 would more simply be 2:3 (both parts of the fraction divided by 5).

**5. Estimating results**

When doing any calculations it helps to estimate what the result is likely to be because then you can detect if you make a mistake. In the exam they could ask you to estimate results so it’s something you need to practice.

Consider the fraction 19/36. It is very close to 18/36 which is the same as a half (50%) therefore the answer should be slightly more than a half.

If asked to estimate the answer to 185,363x46,208 then you can round the numbers up to

200,000 and 50,000 and you can do 2x5 and add the nine zeros to get a rough answer of =10,000,000,000

So you know the answer is going to be less than this but not by too much. The actual answer is 8,565,235,504

**Mini test two**

Once you have completed each mini test scan the QR code next to mini test one, mark you answers and put your score into the table. If some answers were incorrect look over the area again and redo the question until you get it right. Remember you get marks for your workings! **All answers should be to one decimal place.**

1. 95% of *all* students study Psychology this year said that they enjoyed the course, how would you write this a decimal? (1 mark)

1b How could this be expressed as a fraction? (2 marks)

2. 32% of the second year students who studied Psychology this year said that they will be studying Psychology at university next year. How would you write this as a decimal? (1 mark)

2b How could this be expressed as a fraction? (2 mark)

3. 2% of Psychology students own a garden gnome, how is this written as a decimal? (1 mark)

3b How could this be expressed as a fraction? (2 marks)

4. Of the 280 students studying first year Psychology 80 had studied GCSE Psychology, express this as a fraction (2 marks)

5. Of the total number of students studying Psychology 189 of them were males. What is the ratio of males to female students studying Psychology at BHASVIC? (3 marks)

6. During an experiment conducted by Psychology students 80 participants were deceived, 32 of these participants later asked to withdraw their data as they felt unhappy. Express this as a fraction (1 mark)

6a. 3/8 of participants in the experiment said they had enjoyed taking part in the research, express this as a percentage (2 marks)

7. Estimate what the result would be if asked to multiply 3,21363 by 2,900. Do not use a calculator. (3 marks)

**Total- /20**

**6. Interpreting mathematical symbols**

You need to know the following symbols and be able to work with them in an exam question.

|  |  |
| --- | --- |
| Symbol | Meaning |
|  < | Less than |
|  > | Greater than |
|  ≤ | Less than or equal to |
|  << | Much less than |
|  >> | Much more than |
|  ≈  | Approximately equal |
|  \propto \!\, | Proportional to |

**7. Measures of central tendency-mean, median, mode**

Students often see the words *measures of central tendency* and claim “we’ve not done this!” You have though! This is just a posh phrase for finding average or the most *typical* values in a set of data. The three you need to know, work out and interpret are the **mean,** the **median** and the **mode**.

**Mean:** This is calculated by adding all the scores in a data set together and dividing by the number of scores.

So, in a data set with the following:-

 5, 7, 7, 9, 10, 11, 12, 14, 15, 17

The total is 107 divided by the number of scores (10) which gives a mean value of 10.7

**Median:** This is calculated by putting all the scores in a data set **in order**, and identifying the score in the middle. In an even numbered data set, the two middle scores are added together and divided by 2 to find the median.

In the above data set: 5, 7, 7, 9, **10, 11**, 12, 14, 15, 17

They are already arranged in order, they are an even set, the two middle scores are 10 and 11, so the median is 10.5 (21/2).

**Mode:** This is the most commonly occurring score. In some data sets, there may be more than one mode (bi-modal). In the above set of data the modal value is 7.

**8. Measures of dispersion-range, standard deviation**

Measures of central tendency tell us about the ‘averages’ of a set of data, but we also need to know how ‘*spread out’* the data is. This just means how far scores vary and differ from one another and there are two measures you need to know called the **range** and **standard deviation**. There is just a tiny bit of maths here!

**The range:** This is an incredibly easy measure of dispersion to calculate. It involves subtracting the lowest score from the highest score, and (usually) adding 1.

For the following:- 5, 7, 7, 9, 10, 11, 12, 14, 15, 17

The range would be (17 – 5) + 1= 13

**The standard deviation:** This is a sophisticated measure of dispersion. It is a single value that tells us how *far* scores deviate (move away from) the mean. You do NOT need to work this out just interpret it so you don’t need to worry about this yet but if you would like to get ahead for next year scan the QR code for more information.

******

 **Standard deviation extension**

**Mini test three**

Once you have completed each mini test scan the QR code next to mini test one, mark you answers and put your score into the table. If some answers were incorrect look over the area again and redo the question until you get it right. Remember you get marks for your workings!

**The following data sets were gathered in a study looking at driver error and stress**

**A: 8, 6, 14, 9, 13, 8, 9, 8, 7, 7, 10**

**B: 22, 12, 14, 21, 20, 14, 14, 18, 16, 17, 17**

1. What is the mean of data set A (2 marks)

2. What is the mean of data set B (2 marks)

3. What is the median of data set A. (2 marks)

4. What is the median of data set B. (2 marks)

5. What is the mode of data set A (1 mark)

6. What is the mode of data set B (1 mark)

7. What is the range for data set A (2 marks)

8. What is the range for data set B (2 marks)

**Total- /14**

**Extension and practice activities**

**Want to try more questions?**

Scan here for extra questions and answers. There is space for workings out below.

**Space for your workings.**

![C:\Users\a.fantis.BHA.000\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\CYCAANG8\confidence[1].jpg]()

**Are you a really confident mathematician?** Start to really extend your learning by looking at year two statistics.

Scan below to learn about the sign Test.