Bridging work for Mathematical Studies L3

Welcome to Mathematical Studies Level 3, or what everyone generally calls 'Core Maths'. It is a course focused on applying Maths to solve problems in the real world, and it requires you to remember many elements of your GCSE learning. In this bridging work, you can recap basic Maths methods and start to analyse complex worded questions, as this is a major part of what we'll be doing on the course.

There are also some stats, data and graphing questions to practice, using a website that poses problems for you to solve. Have a go and we'll see you in September.

A) Maths Percentage Recap

	Workings/Answer	Confidence Out of 10
1. Find 42% of £42.50		
2. Increase 600m by 35%		
3. Decrease £13,000 by 22%		
4. Increase £40 by 40%, then decrease that amount by 40%.		
5. There are 12 boys in a class, and 18 girls. What percentage of the class are boys?		
6. A tin of beans normally costs 38p but has been discounted to 24p. By what percentage has the price been reduced?		
7. What is £11,000 with 4% compound interest added yearly, after 5 years?		
8. What is £10,000 with 0.2% compound interest added monthly, after 2 years?		
9. Mike bought a coat in a sale. He paid £40.50 in a "25% off everything" sale. How much was the coat before the sale?		
10. Apparently 65% of UK teenagers like Maths. If 292,500 UK teenagers like maths, how many teenagers are there in the UK?		

B) Worded Questions

Online Gaming Facts

Lots of us love playing games with our friends, but what about online gaming with your parents? That's what internet safety charity Internet Matters is suggesting, to help parents better understand the risks and benefits gaming poses to their children. Their report 'Parenting Generation Game,' says 81 percent of under-18s in the UK regularly play online games, but only 58 percent of parents have tried it for themselves.

Carolyn Bunting, chief executive of Internet Matters said: "We know that parents who regularly get involved with their children's activities online are better placed to lead them through some of the issues they may face." "We're encouraging parents to do something that may well go against their nature and have a go - get involved. With an overwhelming majority of children playing online games now, it has become part and parcel of growing up in the digital age." The report is based on a survey of 2,000 UK parents with children aged between four and 16. But it seems dads are more keen on the idea of playing games alongside their children than mums. Forty-nine percent of male parents agreed that gaming was a valid form of quality time with their child, while only 39 percent of female parents felt the same way. Fifty-five percent of parents worry strangers will contact their child through online gaming platforms, with a third (38%) saying they're unsure who their child is playing with online. Half of parents also worry their child will become addicted to games.

YouTuber or Astronaut?

What do you want to be when you grow up? An astronaut, musician, professional athlete, teacher or vlogger/YouTuber? This was the question asked to 3,000 kids aged 8 to 12 in the UK, United States and China, in an online survey. The overall results show they are three times more likely to want to be a YouTuber (29%) than an Astronaut (11%). But interestingly, a much higher percentage of children in China wanted to be an astronaut than in the UK and US.

While 56% of kids in China wanted to be an astronaut, only 11% of those in the US and UK gave the same response. The most sought after job for kids in the UK and US was being a vlogger or YouTuber, with 30% in the UK and 29% in the US naming is as their dream job. In fact for kids in the UK and US, becoming an astronaut was named the least popular job, coming behind jobs like teacher (2nd), professional athlete (3rd), and musician (4th). The survey was carried out by LEGO and The Harris Poll, to find out kids attitudes toward and knowledge of space, in the run up to the Apollo 11 anniversary. In China, being a YouTuber was named the least popular job among the children who took part, with only 11% wanting to try it as a job. But although this might sound strange, when we take into account that fact that many kids in China cannot watch YouTube or other video-streaming websites, it actually makes a lot of sense. This is due to China's strict censorship laws, which means many websites are blocked by the country's government.

a) Does the gaming 81% figure fit in with what you expect?

b) Give an example of why the gaming article is not particularly clear.

c) In the astronaut article, is it acceptable to suggest that 29% is three times more than 11%?

d) How many Chinese kids wanted to be an astronaut?

e) How many more UK kids wanted to be a YouTuber than Chinese kids?

C) Money Questions

1. **Overdrafts** - After making a deposit, Damien's bank account went from £1,680 overdrawn to £425 in credit. How much was deposited?

(a) £1,025   (b) £2,255   (c) £1,255   (d) £2,105

2. **Getting to work** - Rail fares are set to rise by 3.5%. If a season ticket costs £1,650 now, how much will it cost after the increase, to the nearest pound?

(a) £1,654   (b) £1,665   (c) £1,708   (d) £1,995

3. **Holiday money** - If the current exchange rate for US dollars is £1 = $1.22, how many dollars should you get for £210, to the nearest 10 dollars?

(a) $190   (b) $230   (c) $260   (d) None of these

4. **At work** - FitURite garage employs one manager and nine fitters. The average (mean) salary for all employees is £16,600. If the manager's salary is £22,000, what is the average salary of the fitters?

(a) £17,000   (b) £18,500   (c) £15,800   (d) £16,000

5. **At the petrol station** - You have a voucher to save 10p a litre on fuel. How much would you save when filling up an empty 12 gallon fuel tank? (one gallon = 4.5 litres)

(a) £5.40   (b) £4.50   (c) £4.95   (d) £5.25

6. **Splitting a restaurant bill** - Three people shared a restaurant bill equally. Their meals cost £15.50, £17.00 and £16.50, and their drinks cost a total of £24.98. They left a 10% tip. How much did each person pay?

(a) £27.13   (b) £29.25   (c) £17.97   (d) £24.6

7. **Paying the rent** - Sandy's gross monthly pay is £2,250, before tax and other deductions. She pays rent of £675 per month. What percentage is this of her gross pay?

(a) 30%   (b) 40%   (c) 50%   (d) 60%

8. **Leftovers** - Marcus has an annual salary of £24,000, before deductions. He pays 18% of his gross salary in tax and national insurance, and another 25% of his gross pay goes on rent. How much is left each month?

(a) £1,579   (b) £1,368   (c) £1,476   (d) £1,140

9. **Debts and savings** - Marcia owes £4,000 on a credit card that she pays 15% interest on. She also has £4,000 in a savings account paying 2% interest. How much better-off will she be each year if she uses her savings to pay off the debt?

(a) £80   (b) £190   (c) £380   (d) £520

10. **Credit cards** - In the UK, about £20,000 is spent using credit and debit cards every second. How much is spent each month? Pick the best estimate.

(a) £945   (b) £5.89bn   (c) £53bn   (d) £111m

D) Fermi Estimates

These are estimates of totals or amounts which are very difficult to guess.
You build up final estimates using reasonable estimates of aspects of the problem
and then combine these estimates appropriately to give you an overall estimate.

EXAMPLE   Estimate the number of human heartbeats in the UK each year.

SOLUTION   There are two key components to estimate here:

a. The number of times a heart beats in a minute – estimate 80.
   - (you might have to measure your own pulse for a while if you didn't know).

b. The population of the UK – estimate 60 million (a number you will get to know).
   - Now for one person in one year the number of beats will be:
   - 80 x 60 x 24 x 365 (can you work out why).

   which is roughly 100 x 50 x 20 x 400 = 40 million

So, for the population of the UK that would be 60 million x 40 million which is 24 with
lots of zeros after it. Luckily this is a calculator qualification so your calculator will tell
you this is 2.4×10^{15} (if you can remember what standard form is)

Now can you attempt a Fermi estimate for:

a. How long you will spend on the phone in your lifetime.

b. How many white cars there are in the UK?

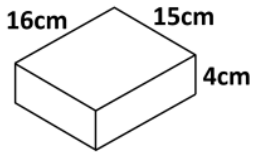# E) Volume, Data & Stats Questions

Visit www.weneedmaths.com and click 'videos' at the top. For each video listed below, watch the clip then rewind until all the data/information is on the screen. Show all workings along with your answers.

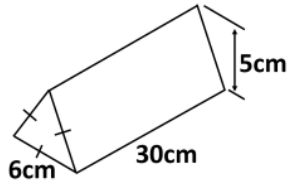1) S013 - Swimming pool volume (1)
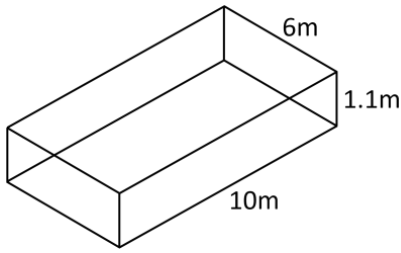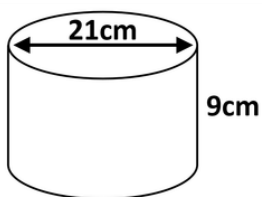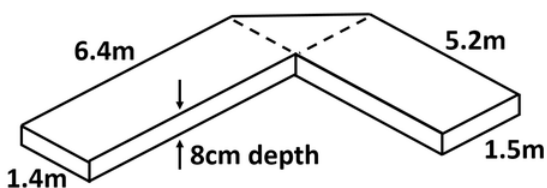

2) S010 – Wrapping paper

Shortbread

Chocolate

3) S012 – Icing on the cake

4) S018 – Gravel path volume (2)

5) D002 – Shoebox frequency table

Category	Tally	Freq.	%
Boys 2-7 yrs	IIII IIII IIII I		
Boys 8-14 yrs	IIII IIII		
Girls 2-7 yrs	IIII IIII IIII		
Girls 8-14 yrs	IIII III		
Home	II		
Total			100%

6) D003 – Cumulative Visitors

Day (d)	Month	Visitors
1 < d ≤ 59	Jan - Feb	3000
60 < d ≤ 120	Mar - Apr	10000
121 < d ≤ 181	May - Jun	17000
182 < d ≤ 243	Jul - Aug	24000
244 < d ≤ 304	Sep - Oct	19000
305 < d ≤ 365	Nov - Dec	7000
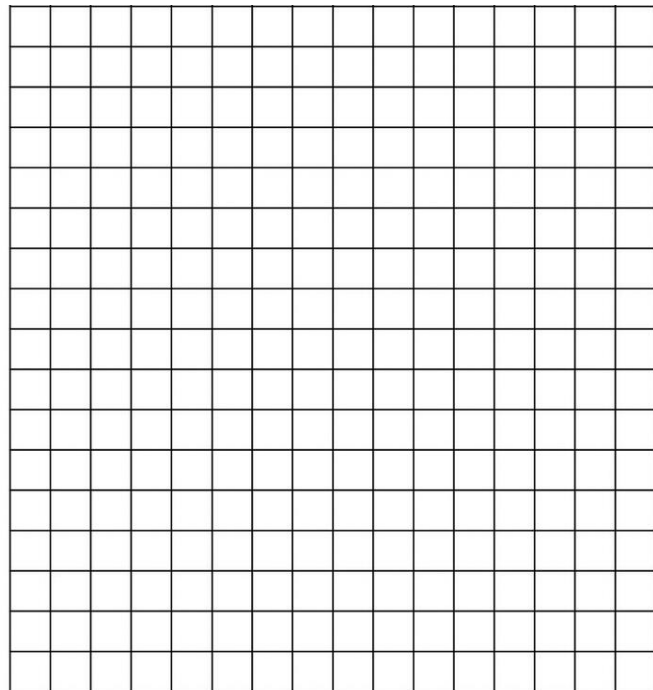
7) D016 – Harry Potter Bar Chart
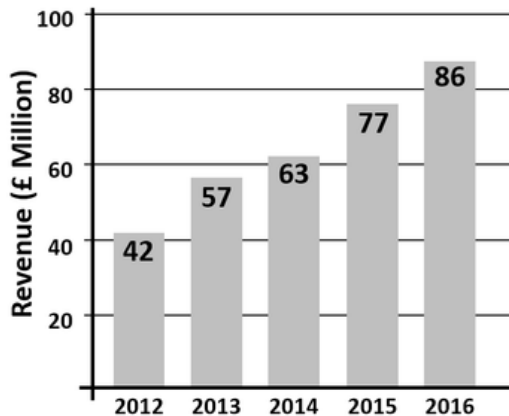
8) D008 – Modal and Mean guests

Guests Per Cabin	Frequency
1	9
2	32
3	24
4	45
5	61
6	35

9) D014 – Snow scatter graphs
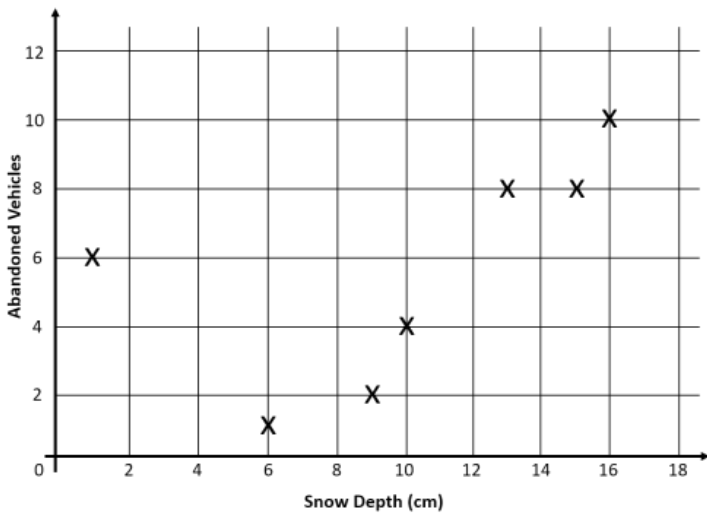
10) D011 – Ferry Vehicle Lengths

Vehicle Length (L metres)	Frequency
0 < L ≤ 3	18
3 < L ≤ 4	28
4 < L ≤ 5	81
5 < L ≤ 6	70
6 < L ≤ 10	32
10 < L ≤ 15	21
15 < L ≤ 20	16