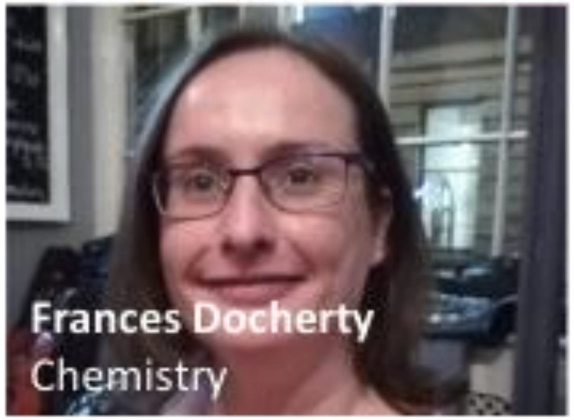
Using Numbas for cross disciplinary maths support - A Student/Staff Partnership

EAMS Presentation 2022

Numbas Project Team



Glasgow Numbas Question Pool

Glasgow Numbas Question Pool

Glasgow Numbas Question Pool

+ New: Folder | Question | Exam

8 items in this folder.

Select all   Select none

Status	Name	Type
☐	Basic Algebra Skills	
☐	Basic Statistics	
☐	Basic Trigonometry and Pythagoras	
☐	Linear Graphs	
☐	Logs and Exponentials	
☐	Numeracy	
☐	Quadratics	
☐	Roots and Indices	

Stream A : Tess	Stream B : Anna	Stream C : Michael
Name	**Name**	**Name**
A1 Basic algebra, equation rearranging – 10-20 q	B1 units, rounding, scientific notation, Percentage returns	C1 Differentiation - basic
A2 Logs and exponentials	B2 Basic trigonometry (angles, sin, cos, tan)	C2 Differentiation – product, quotient, chain
A3 Quadratics	B3 Pythagoras 2D and 3D	C3 Z-tests
A4 Graphs - linear	B4 Further trigonometry (sine and cosine rules)	C4 Integration – basic, definite, indefinite
A5 Graphs - Quadratic	B5 Vectors and polar Coordinates	C5 Integration – area under/between curves

Excel Spreadsheet

	A	B	C	D	E	F
1	**Topic**	**Question type**	**Staff involved**	**Number of existing questions**	Untested/Tested/Peer Tested	**Progress / Status**
2	C1 - Differentiation	Differentiate basic polynomials	RD, FD, EP	3(R)		
3	C1 - Differentiation	Differentiate polynomials with fractions, negatives and roots as coefficients and powers	RD, FD, EP	7(R)		
4	C1 - Differentiation	Differentiate expressions involving sinx, cosx, e^x, ln|x|	RD, FD, EP	3(NR)|5(R)		
5	C1 - Differentiation	Use differentiation to find the stationary points of a function	RD	1		
6	C1 - Differentiation	Use differentiation to find the gradient of a function at a particular point	RD, FD	1(R)		
7	C1 - Differentiation	Find the second derivative of a function	RD, FD	1(NR)|4(R)		
8	C1 - Differentiation	Use the second derivative to determine the nature of a stationary point	RD	2(R)		
9	C2 - Further differentiation	Find the partial derivatives of a function		5		
10	C2 - Further differentiation	Differentiate expressions that require the use of the product rule	RD, FD, EP	5(R)		
11	C2 - Further differentiation	Differentiate expressions that require the use of the quotient rule	RD, FD, EP	5		
12	C2 - Further differentiation	Differentiate expressions that require the use of the chain rule	RD, FD, EP	5(R)		
13	C2 - Further differentiation	Differentiate expressions that require the use of a combination of the above rules	RD, FD, EP	1		
14	C3 - Z-tests		EP			
15	C3 - Z-tests		EP			
16	C3 - Z-tests		EP			
17	C3 - Z-tests		EP			
18	C3 - Z-tests		EP			
19	C4 - Integration	Integrate basic polynomial expressions	RD, FD, EP			
20	C4 - Integration	Integrate polynomials with fractions, negatives and surds as coefficients and powers (but not x^(-1))	RD, FD, EP			
21	C4 - Integration	Integrate expressions involving sinx, cosx, e^x and x^(-1)	RD, FD, EP			
22	C4 - Integration	Integrate functions of linear functions i.e. f(ax+b) using the chain rule in reverse	RD, FD, EP			
23	C4 - Integration	Evaluate a definite integral	RD, FD, EP			
24	C5 - Further integration	Find the area under a curve between two limits	RD, EP			
25	C5 - Further integration	Find the area between two curves and two limits	RD, EP			
26	C5 - Further integration	Find the area contained by a curve and the x-axis (by find where the curve crosses the x-axis first)	RD			
27	C5 - Further integration	Find the area contained between two curves (by finding the points of intersection first)	RD			
28						

Coding and Designing a Question

Advice

Edit Insert View Format Table Tools

Formats B I

```
In order to solve this question, you need to identify that we are solving for this equation: $FV=PV(1+r)^n$

Therefore to solve for the future value:

$FV=PV(1+r)^n$

We know that the PV is £{num_PV}million, we know that r = {num_return*100}% and we have {num_period}
periods of compounding.  Therefore:

\(FV = PV(1+r)^n\)

\(FV = \var{num_PV}(1+\var{num_return})^\var{num_period}\)

\(FV = \var{answer}\text{million}\)

Alternative approach to solving:

You may also solve this question using the financial tables.

The future value factor (FVF) of {num_return*100}% for {num_period} periods is: {factor} or {factor_rounded}
to 4 decimal places.

\(FV = PV * FVF(\var{num_return*100} \text{%,} \var{num_period})\)

\(FV = \var{num_PV}*\var{factor_rounded}\)

\(FV = \var{answer}\text{million}\)
```

Give a worked solution to the whole question.

Advice

In order to solve this question, you need to identify that we are solving for this equation: $FV = PV(1+r)^n$

Therefore to solve for the future value:

$$FV = PV(1+r)^n$$

We know that the PV is £{num_PV}million, we know that r = {num_return*100}% and we have {num_period} periods of compounding. Therefore:

$$FV = PV(1+r)^n$$

$$FV = \{num_{PV}\}(1 + \{num\_return\})^{\{num\_period\}}$$

$$FV = \{answer\} \text{ million}$$

Alternative approach to solving:

You may also solve this question using the financial tables.

The future value factor (FVF) of {num_return*100}% for {num_period} periods is: {factor} or {factor_rounded} to 4 decimal places.

$$FV = PV * FVF(\{num\_return \times 100\}\ \%, \{num\_period\})$$

$$FV = \{num_{PV}\} * \{factor\_rounded\}$$

$$FV = \{answer\} \text{ million}$$

Click to edit

A government bond issued in {place} has a coupon rate of {coupon}%, face value of €{face} and the bond matures in {period_years} years.

Assuming that the coupons are paid on an annual basis. Calculate the price of a bond (in euro) if the yield to maturity is {ytm}%.

€ Unnamed gap

Click to edit

Advice

Advice

A number is in scientific notation if it is written as a decimal multiplied by some power of 10, where the decimal has exactly one digit in front of the decimal place. For example:

$$1.234 \times 10^6, \quad \text{and} \quad 3.01 \times 10^{-3}$$

are both in scientific notation.

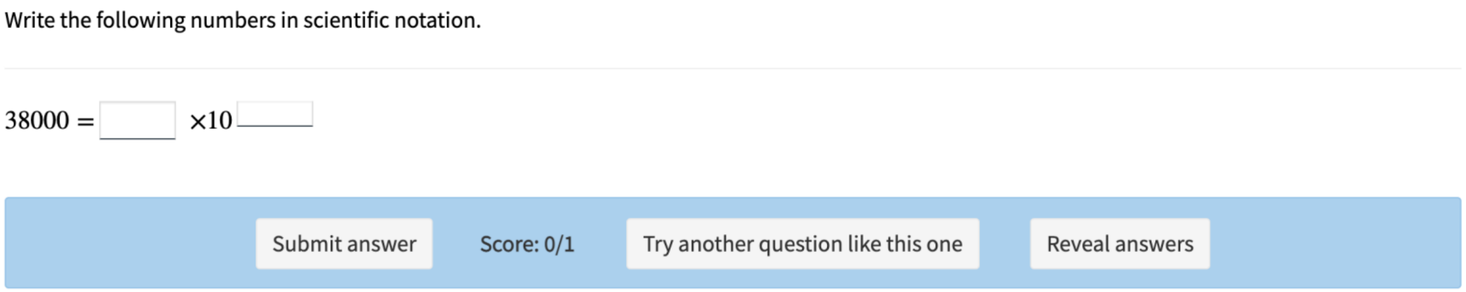
Suppose we have the number 213. In scientific notation, this number would start with 2.13 since we only want one digit in front of the decimal point. The decimal point is currently to the right of the last digit in 213 and needs to move to between the first and second digits, that is 2.13. Count the places that the decimal point must jump and you get 2 places. That is,

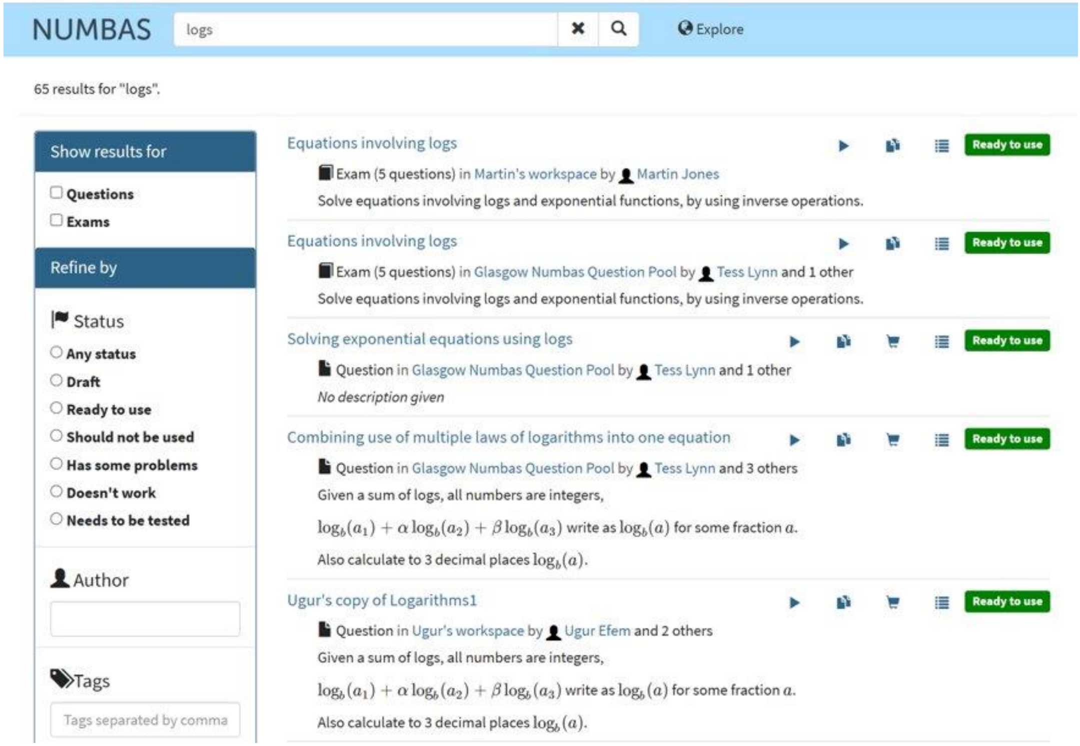
$$213 = 2.13 \times 10^2$$

We have a *positive* 2 as the power because we need to make the number 2.13 *bigger* to get to 213.

Possibilities

- Repeated attempts
- Range of questions
- Topic specific
- Search tool
- Personalised learning





New Developments

Numbas Chemistry Summer Placements

- 2 students for 4 weeks (Tess and a new member of the team)
- Create a database of practice questions for 1st and 2nd year physical chemistry topics:
  - Thermodynamics
  - Electrochemistry
  - Solutions and pH
  - Kinetics (rates of reactions)
- Writing questions completely from scratch.
- Share with the Numbas community.

Questions and thanks for listening

- If interested, contact one of the project team:

Ruth Douglas - Ruth.Douglas@glasgow.ac.uk

Beth Paschke - Beth.Paschke@glasgow.ac.uk

Frances Docherty - Frances.Docherty@glasgow.ac.uk

- Information and demo of question types at - https://www.numbas.org.uk/