Show all your work whenever there are formulas and computations involved!

1.   A problem has an exact value of x = 0.3479.

   (a)   Write down the exact value of x in the form $a \bullet 10^k$, where k is an integer and $1 \leq a < 10$.

   (b)   State the value of x correct to **two** significant figures

   (c)   Calculate the percentage error if x is given correct to **two** significant figures.

2.   A science teacher is writing a test for her Chemistry class. The test will have true and false questions worth 5 points each and multiple choice questions worth 10 points each for a total of 200 points. He wants to have twice as many multiple choice questions as true and false questions.

   (a)   Let **a** represent the number of true and false questions and **b** represent the number of multiple choice questions. Write a system of equations that represents the number of each type of question.

   (b)   How many true and false questions and how many multiple choice questions will be on the test?

3.   **(a)**   The first term of an arithmetic sequence is 18 and the fifth term is 12.
                    Calculate the value of the common difference (d).

   (b)   The third term of a geometric sequence is 0.5 and the seventh term is 40.5. All the terms in the sequence are positive. Calculate the value of the common ratio(r) and the value of the first term of the sequence (u_1).

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4.   **(a)**   Convert 0.003854 metres to millimetres (mm). Give your answer to the nearest mm.

       The acceleration of an object has units measured in metres per second squared.

    (b)   Write down the symbol used to show acceleration.

       In the SI system, force is measured in newtons. The force needed to produce an acceleration, a, on an object with mass (kg), m, is given by $F = m \bullet a$, where F is measured. This is Newton's second law.

    (c)   Write down the correct combination of SI units (m, kg, s) for force.

    (d)   Calculate the force needed to cause an acceleration of 20 ms^{-2} on a soccer ball that has a mass of 0.450kg.

5.   A swimming pool is to be built in the shape of a letter L. The shape is formed from two squares with side dimensions x and $\sqrt{x}$ as shown.

Not drawn to scale.
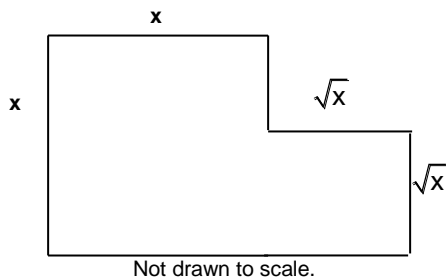
    (a)   Write down an expression for the area, A, of the swimming pool surface.

    (b)   The area, A, is to be 56m^2. Write a quadratic equation that expresses this information.

    (c)   Find both the solutions of your equation in part **b.**

    (d)   Which of the solutions in part **c** is the correct value of x for the pool? State briefly why you made this choice.

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6.   **(a)**   Given $x = 3.7 \times 10^{-3}$ and $y = 4.0 \times 10^{6}$, calculate the value of $w = x \bullet y$. Give your answer in the form
                $a \bullet 10^{k}$, where $1 \le a < 10$ and $k \in \mathbb{Z}$.

    (b)   State to which of the following number sets $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$ each value belongs.
                i.   x   **ii.**   y   **iii.**   w

                iv. x + y   **v.** $\dfrac{1}{w}$

7.   In 2000 Traci joined a swim club. The fees were £600 a year. Each year the fees increase by 6%.

    (a)   Calculate, **to the nearest £1**, the fees in 2003.

    (b)   Calculate the total fees for Traci who joined the swim club and remained a member for seven years. (she
                starts as a member in 2000)

8.   A woman deposits $200 into her son's savings account on his first birthday. On his second birthday she deposits
       $250, $300 on his third birthday, and so on.

    (a)   How much does money would she deposit into her son's account on his 15th birthday?

    (b)   How much in total would she have deposited after her son's 15th birthday?

9.   **(i)**   The nth term of an arithmetic sequence is given by $u_n = 85 - 7n$.

          (a)   Calculate the values of the first two terms of this sequence.

          (b)   Which term of the sequence is -83?

          (c)   consecutive terms of this sequence, u_k and u_{k+1}, have a sum of 37. Find k.

9.   **(ii)**   A racketball is dropped vertically. It reaches a height of 6 feet on the first bounce. The height of each subsequent bounce is 90% of the previous bounce.

    (a)   What height does it reach on the seventh bounce?

    (b)   What is the total vertical distance traveled by the ball between the first and sixth time the ball hits the ground?

10.   The cost of boring a well 300 metres deep is calculated from the following information:

      The cost for the first metre is $20.00, and then the cost per metre increases by $2.00 for every subsequent metre.

      Find:

      (a)   the cost of boring the 300th metre;

      (b)   the total cost of boring the well.

11. $120 is invested at 10% compounded annually.

   (a)   What is the amount after 2 years?

   (b)   How long will it take for the original investment to double? Give the answer to the nearest year.

12. $500 is invested at 6% interest. Determine the total amount of money at the end of 5 years if the interest is:

   (a)   simple

   (b)   compounded annually

   (c)   compounded quarterly

   (d)   compounded monthly

13.   A bank takes as commission £1.25 on every £100 <u>or</u> part of £100 to be changed into Swiss francs. At the bank, a teacher changed £350 into Swiss francs at the rate of 2.2 Swiss francs to the pound, and shared the Swiss francs equally among 3 prize winners.

   (a)   How much commission, in pounds sterling, did the bank take?

   (b)   Calculate how many Swiss francs (to the nearest 10 Swiss francs) each winner received.

14.   The following is part of a display on the notice board of a bank in the United Kingdom. It shows the exchange rate between one British pound (GBP) and other currencies.

EXCHANGE RATES		
	Bank buys foreign currency	**Bank sells foreign currency**
Denmark (KR)	11.38	10.78
Finland (MKK)	7.00	6.60
France (FFR)	10.05	9.45
Germany (DM)	2.854	2.798
Greece (DR)	292	266
NO COMMISSION IS CHARGED		

Geraldine eats a meal in a restaurant while on holiday in Greece. The meal costs 4256 drachma (DR).

   (a)   Use the **bank-selling** price to calculate the cost of the meal in British pounds.

   The Williams family goes to Germany. Before leaving, they change GBP 600 into German marks.

   (b)   Calculate the number of German marks they receive for GBP 600, giving your answer correct to **two** decimal places.

They spend DM 824 in Germany, and on returning to the United Kingdom, they change their **remaining** German marks into British pounds.

   (c)   Calculate the number of British pounds they receive, correct to **two** decimal places.

15.   Mario has spent $ 30000 to buy some land. The land increases in value by 5% each year.

   (a)   What is the value of the land after the end of five years?

   At the end of five years, Mario sells the land. He pays 2% tax on the sale and spends the rest of the money on a car. The car loses value at a rate of $ 2500 every year.

   (b)   How much tax does Mario pay?

   (c)   How much is the car worth five years after Mario buys it?

16.   Zog from the planet Mars wants to change some Martian Dollars (MD) into US Dollars (USD). The exchange rate
       is 1MD = 0.445 USD. The bank charges 2% commission.

       (a)   How many US Dollars will Zog receive if she pays 4500 MD?

       Zog meets Zania from Venus where the currency is Venusian Rupees (VR). They want to exchange money and
       avoid bank charges. The exchange rate is 1 MD = 1.82 VR.

       (b)   How many Martian Dollars, to the nearest dollar, will Zania receive if she gives Zog 2400 VR?

17.   William invests $2200 in an account for 5 years at a rate of 2.75% compounded annually.

       (a)   Calculate the amount of money he has in the account at the end of five years.

       (b)   The interest rate then drops to 2.25%. If he continues to leave his money in the account,
               find out how much it will be worth after a further 3 years.

18.   Bob invests 800 EUR in a bank that offers a rate of 2.75% compounded annually, where interest is added on at
       the end of each year.

       (a)   Calculate how much money Bob has in the bank after 4 years.

       (b) Calculate the number of years it will take for the investment to double.

       Ann invests 800 EUR in another bank that offers interest compounded annually. Her investment doubles in 20
       years.

       (c) Find the rate that Ann's bank is offering.

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19.   A student invested a sum of money for 3 years at compound interest calculated yearly. At the end of the first and second years the money amounted to 1260 Swiss francs and 1323 Swiss francs respectively.

      Calculate the rate of interest

20.   Two students, Ann and Ben, play a game. Each time Ann passes *GO* she receives $15. Each time Ben passes *GO* he receives 8% of the amount he already has. Both students start with $100.

      (a)   How much money will Ann have after she has passed *GO* 10 times?

      (b)   How much money will Ben have after he has passed *GO* 10 times?

      (c)   How many times will the students have to pass *GO* for Ben to have more money than Ann?