PiXL Independence:

Mathematics – Student Booklet

KS4 FOUNDATION

Topic 1 – Decimals, Estimation, Best Buy and Exchange Rates

Contents:

    I.   Basic Skills Check – 10 credits per skill check.

    II.   Short Exam Questions – 30 credits per section.

    III. Further Practice – 30 credits each.

    IV. Investigations – 80 credits each.

    V.   Academic Reading – 50 credits each.

I. Basic Skills Check

Answer the following questions. In order to improve your basic arithmetic you should attempt these without a calculator

Skills Check 1

1. What is the product of 14 and 11?

2. A box of chocolates priced at £6.00 is reduced by a third. What is the new price?

3. Write down ANY three factors of 12.

4. Which of these numbers is prime?
   2   4   6   8

5. Simplify 3J + 9k − 2k + 9J.

6. Solve: $3x + 6 = 18$.

7. Find a.
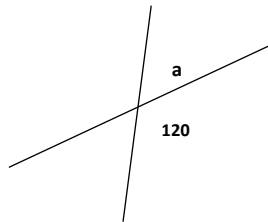
8. In a class of 30 students $1/5^{th}$ of the class are left handed. How many are left handed?

9. Expand the bracket 3(a-7).

10. In a quadrilateral the angles are 125^0, 45^0, 110^0 and A. Find the value of A.

Skills Check 2

1. An electricity bill is £82 plus VAT at 5%. Calculate the VAT charged.

2. A bunch of flowers priced at £9.60 is reduced by a third. What is the new price?

3. Write down all the factors of 24.

4. Round 5830 to one significant figure.

5. Simplify $2x + 7y + 2x - 3y$.

6. Solve: $5p - 4 = 31$.

7. Find A.

A

65^0 36^0
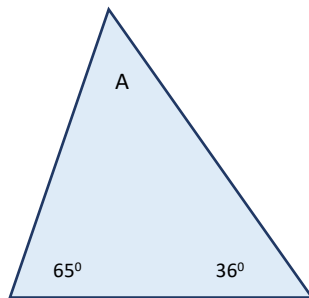
8. In a class of 30 students the probability that a pupil has brown eyes is $1/6^{th}$. How many students have brown eyes?

9. Expand and simplify $3(a+7) + 2(a+3)$.

10. Find the next two terms in the sequence;   4, 9, 14, 19, ………

Skills Check 3

1. A coat costs £75, delivery costs a further 5%. What is the delivery charge?

2. A train ticket that costs £48.80 is reduced by a ¼. What is the new cost?

3. Find the highest common factor (HCF) of 12 and 30.

4. Round 7.65952 to two significant figures.

5. Expand 3(7x – 7).

6. Solve: 7p + 9 = 30.

7. Find b.
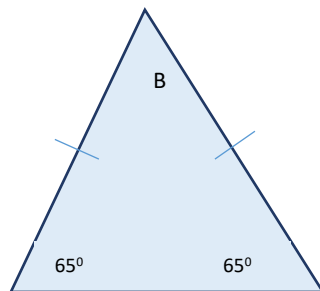
8. In a packet of 12 sweets 4 are red. You take a sweet without looking; what is the probability of choosing a red sweet?

Calculate $\frac{2}{3} + \frac{1}{4}$

Find the next two terms in the sequence; 1, -4, -9, -14………

II.   Short Exam Questions

Section 1 – Basic Calculations

1. Write five thousand, three hundred and four in figures.

2. Write 2 469 020 in words.

3. Calculate, without the use of a calculator,

   a) 159×100
   b) 0.381×10
   c) $32 \div 10$
   d) $248 \div 1000$

4. Given 47 x 29 = 1 363, work out, **without using a calculator**:

   a) 4.7 x 29
   b) 47 x 290

5. Calculate each of the following:

   a) $9 - 10$
   b) $-3 - 8$
   c) $-5 + (-10)$
   d) $7 - (-4)$
   e) $-9 - (-9)$

6. Calculate each of the following:

   a) -10×14
   b) -3×-4

7. Calculate $45 - 7 \times 3$.

8. Calculate $\dfrac{18 \times 3}{2 + 4}$.

9. Insert brackets where necessary to make the following calculation correct
   $12 + 3 \times 14 - 2 = 180$.

10. Calculate $150 - \left(7 \times \left(4^2 + 1\right)\right)$.

Section 2 - Rounding, Mental Methods of Calculating

1. John thinks that $(7 \times 3)^2 = 7 \times 3^2$. Is this correct. Explain your answer.

2. Round 456.009 to

   a. Nearest ten.
   b. 1 decimal place.
   c. 2 decimal places.
   d. 2 sig fig.
   e. 3 sig fig.

3. **Without using a calculator** and given that $563 \times 2.1 = 1182.3$ down the value of

   a. 56.3×2.1
   b. 5630×2.1
   c. 56.3×21

4. Mr Robinson is buying carpet for his dining room. He requires 14.6 square metres of carpet and it is advertised at £6.79 per square metre. Work out **roughly** how much the carpet will cost. Show all your working clearly.

5. Calculate the following using a **mental method. Show all your working clearly.**

   a. 15×0.4
   b. $9 \div 0.5$
   c. 1.2×0.08
   d. $21 \div 0.3$

6. A shoe box has measurements 0.42 m by 0.18 m by 0.14 m. Miss Bartholomew wants to cover the box with pretty paper. **Estimate** the surface area of the box. **Show all your working**.

7. Find an approximate value of $\dfrac{48.8 \times 5.22}{(10.13)^2}$ You **must** show all your working.

8. Here is a method for multiplying a whole number by 101.
   Step 1: Put two zeros onto the right hand side of the number.
   Step 2: Add on the original number.
   Use an example to show that this method works by comparing your usual method with the method suggested above.
   Explain why this works.

9. Rounding all numbers to 1sf <u>write down</u> and solve a calculation you would use to estimate answers to:
   a) 379 ÷ 19   b) 238 x 47   c) 1037 + 282   d) <u>462 x 79</u>
                                                       0.42

Section 3 - Further Calculations

1. First estimate then write down exact answers:

   1. 3.4 + 12.55
   2. 6.92 + 0.04
   3. 5.32 + 7.81
   4. 3.58 + 2.7

2. First estimate and then write down exact answers:

   a) 2.16 – 1.08   b) 6.49 – 2.36
   c) 14.46 – 9.88   d) 4.29 – 3.67

3. Work out these calculations using a standard written method. <u>Remember to show all working</u>.

   a) 31.55 + 107.34
   b) 45.872 + 104.71
   c) 12.45 + 0.551
   d) 2.37 – 1.5
   e) 23.303 – 14.72
   f) 18.32 – 9.156

4. Work out these calculations. <u>Show all working</u>.

   a) 3.2 x 8
   b) 12.4 x 0.6
   c) 6.3 x 2.4
   d) 12.6 x 27
   e) 55.27 x 3.64

5. Work out these calculations. <u>Show all working</u>.

   a) 3.2 ÷ 8
   b) 12.4 ÷ 6
   c) 34.83 ÷ 0.9

6. Adam's car does an average of 10.2 miles per litre of petrol. The cost of petrol is £1.09 per litre. Adam completes a journey of 289 miles. Estimate how much this will cost him.

7. A minibus cost £245 for the day to hire. There are 12 people. **Estimate** how much each person will need to pay.

8. A company need to package boxes into containers. Each small box weighs 12kg. The maximum weight a container can manage is 320kg. What is the maximum number of boxes they can pack in a container? Do this **without** a calculator and explain how you got your answer.

Section 4 - Best Value & Exchange Rates
For each question you should attempt to carry out an estimation first.

1. Apples cost £1 for a 1.4 kg bag at Tesco. The same type of apples cost 87p for a 750g bag at ASDA. Where are the apples better value for money? You must show your working.

2. A pack of 9 kitchen rolls costs £4.19. A pack of 4 kitchen rolls costs £1.76. Which pack gives the better value for money? You must show all your working.

3. The exchange rate in London is £1 = €1.17. The exchange rate in Paris is €1 = £0.76 Janet wants to change some pounds into euros. In which of these cities would Janet get the most euros? You must show all your working.

4. Ann went to France. She changed £400 into euros (€). The exchange rate was £1 = €1.34.

    a) How many euros did she get?
    b) Ann went shopping in France. She bought: 2 scarves for €3.40 each, 1 necklace for €16.40, 1 bag for €10.50. The exchange rate was £1 = €1.34
       Work out her total bill in pounds (£).

5. Sara is going to print 120 photos.

Here is some information about the cost of printing in two shops.

PHOTOBOX 15 prints £2.99.
DIGITAL WORLD 10 prints £3.49, buy one pack get one free.

Sara wants to buy the photos as cheaply as possible.
Which shop should Sara buy the 120 photos from?
You must show how you get your answer.

III.   Further Practice

1. Can you solve the murder?

    https://justmaths.co.uk/Worksheets/Number/AA%20NEW%20-%20Estimating%20to%201%20sigfig%20-%20Whodunnit.pdf

    https://justmaths.co.uk/Worksheets/Number/Bidmas%20-%20Whodunnit.pdf

2. Print off the sheet and play against another person.

    https://justmaths.co.uk/Worksheets/Number/Decimal%20%2B%20and%20-%20Connect%204.pdf

3. Read the information and try to answer the questions. Can you think how you might extend this investigation further?

    https://justmaths.co.uk/Worksheets/Number/Functional%20Skills%20-%20EXCHANGE%20RATES.pdf

4. Answer the exam questions. Then mark your answers.

    http://www.mathsgenie.co.uk/resources/31_exchange-rates.pdf

    http://www.mathsgenie.co.uk/resources/31_exchange-ratesans.pdf

5. Watch the video, then answer all the exam questions and mark your answers.

    http://www.mathsgenie.co.uk/best-buys.html

    http://www.mathsgenie.co.uk/resources/26_best-buys.pdf

    http://www.mathsgenie.co.uk/resources/26_best-buysans.pdf

6. Watch the video and make notes on the questions.

    https://corbettmaths.com/2016/01/03/exchange-rates/

7. Answer all the questions, keep creating a new worksheet until you get full marks.

    http://studymaths.co.uk/workout.php?workoutID=149

IV.   Investigations

For each of the following you should carry out the investigations then read the notes. You need to keep a detailed summary of what methods/approaches you have tried and what you then changed each time.

1. NRICH activities. Follow the instructions, can you extend your thinking further? Follow some of the links? Keep notes of what you are doing at each stage.

   https://nrich.maths.org/13325
   https://nrich.maths.org/7024
   https://nrich.maths.org/746

2. Exploring maths.

   https://wild.maths.org/6-numbered-cubes
   https://wild.maths.org/spirals-spirals

V.   Academic Reading

Maths in the real world.
For each video or article you should make notes and questions you would like answering to extend your understanding and knowledge of maths in the real world.

1. Follow the **'WATCH, THINK, DIG DEEPER, DISCUSS'**
    Where do maths symbols come from?

    https://ed.ted.com/lessons/where-do-math-symbols-come-from-john-david-walters

2. Follow the **'WATCH, THINK, DIG DEEPER, DISCUSS'**
    Banned numbers.

    https://ed.ted.com/lessons/a-brief-history-of-banned-numbers-alessandra-king

3. Follow the **'WATCH, THINK, DIG DEEPER, DISCUSS'**
    Maths anxiety.

    https://ed.ted.com/lessons/why-do-people-get-so-anxious-about-math-orly-rubinsten

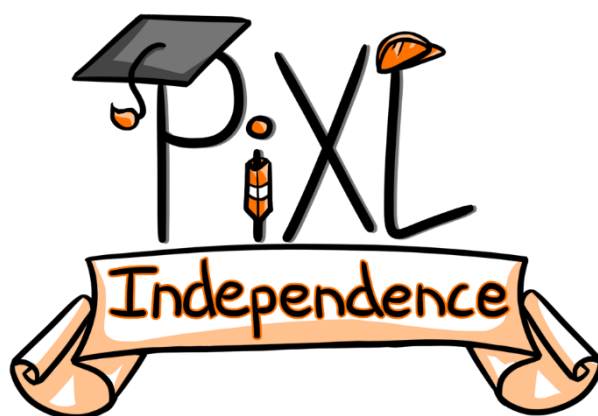4. Read the following article, can you produce a poster, or presentation using this article? Can you research any of these elements further?

    https://www.theguardian.com/science/2012/jan/23/how-learn-love-maths

5. **Japanese Multiplication.**
    Watch the video then design instructions to explain how this works.

    https://www.youtube.com/watch?time_continue=94&v=85Vd0NpL32k

Commissioned by The PiXL Club Ltd.