Year 9 (13+) Entrance Assessments

Sample Maths Paper 1

SOLUTIONS

1. Multiply 607 by 508

    Answer: 308356

2. How many minutes are there in 0.4 hours?

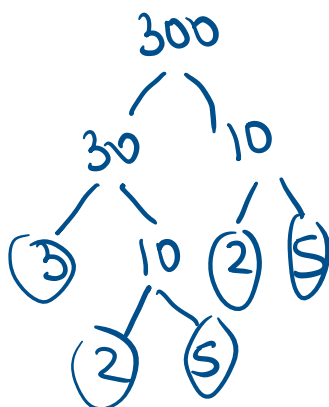 $\frac{4}{10}$ of $60 = 4 \times 6$

    Answer: 24

3. (a) Find the value of $2^3 \times 5^2$

    8×25

    Answer: (a) 200

    (b) Write 300 as a multiplication of prime numbers, leaving your answer in a form that involves indices as in part (a)

    Answer: (b) $2^2 \times 3 \times 5^2$

    300
    30   10
    3 10 2 5
      2 5

4. The height of the Eiffel tower is 2.95×10^2m. What is this in millimetres? Leave your answer in scientific (standard) form.

$$2.95 \times 10^2 \times 10^3$$

$$\text{or} \quad 295 \times 1000 \quad = 295000$$

Answer: 2.9×10^5 mm

5. Solve $\frac{x}{3} + x = 28 - x$

$\Big) \times 3$

$$x + 3x = 84 - 3x$$
$$7x = 84$$

Answer: x = 12

6. Calculate 5.06 x 7.2

Answer: 36.432

7. In this question, a = -3, b = 4 and c = 2

Calculate the value of each of the following

(i) a^3 $= (-3) \times (-3) \times (-3)$ Answer: (i) -27

(ii) $2ab$ $= 2 \times (-3) \times 4$ Answer: (ii) -24

(iii) $(3c - 2a)^2$ $= (6 - -6)^2 = 12^2$ Answer: (iii) 144

8. In the diagram shown below, DF is parallel to EC and AB is equal in length to BC.
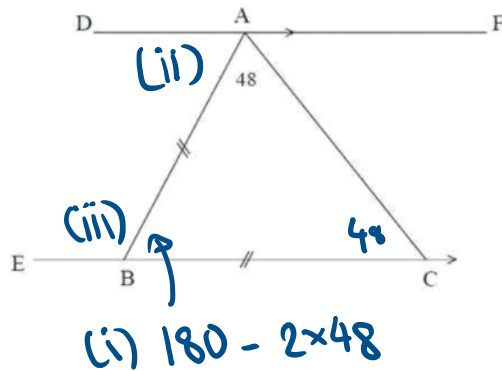
Angle BAC = 48°

Calculate:

(i) Angle ABC

Answer: ____84°____
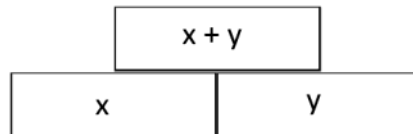
(ii) Angle BAD   Same as ABC
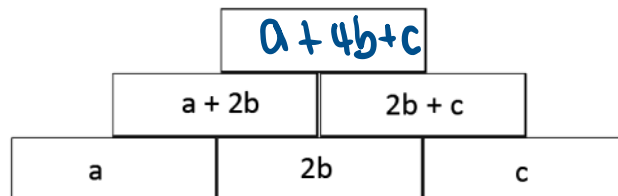
Answer: ____84°____

(iii) Angle ABE   180 - 84

Answer: ____96°____

(ii)

48

(iii)   ↑   48

E   B

(i) 180 - 2×48

9. In these walls, the value of each brick is made by adding the value of the two bricks below it.

i.e.

	x + y	
x		y

(a) Write a simplified expression for the number in the top brick of the wall shown below:

$a + 4b + c$

a + 2b		2b + c
a	2b	c

(b) Fill in the missing expressions in each of the walls shown below: **(write your answers in a simplified form)**

(i)

$3x + 2y - 1$

$2x$ $x + 2y - 1$

| x | x | 2y - 1 |

(ii)

$8x + 3y$

5x + 3y $3x$

| 2x | $3x + 3y$ | -3y |
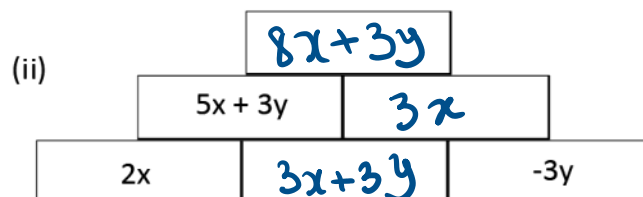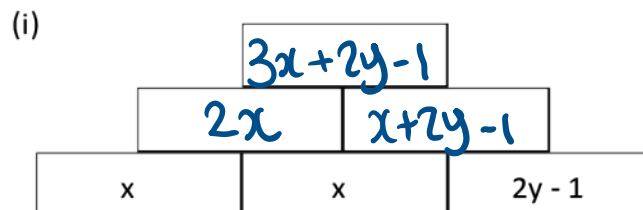
10. Calculate each of the following **[leave fractions in their lowest form]**

(a) $\frac{2}{3} + \frac{7}{12}$ $= \frac{8}{12} + \frac{7}{12} = \frac{15}{12} = \frac{5}{4}$

Answer: $\frac{5}{4}$

(b) $\frac{3}{4} - \frac{1}{4} \times \frac{2}{5}$ $= \frac{3}{4} - \frac{1}{10} = \frac{15}{20} - \frac{2}{20}$

$= \frac{13}{20}$

Answer: $\frac{13}{20}$

(c) $\frac{7}{9} \div 1\frac{2}{5}$ $= \frac{7}{9} \div \frac{7}{5} = \frac{7}{9} \times \frac{5}{7} = \frac{5}{9}$

Answer: $\frac{5}{9}$

11. The SINGLESUM of a number is obtained by repeatedly adding its digits until a single digit remains.

For example, the SINGLESUM of 2482 is 7 because:

2+4+8+2 = 16   then   1+6=7

(a) Write down the SINGLESUM of 998.

Answer: ____8____

$9+9+8 = 26$
$2+6 = 8$

(b) Find an ood number between 200 and 220 with SINGLESUM equal to 1.

we need 10

217

$(2+1+7 = 10, 1+0 = 1)$

Answer: ____217____

A number is called SPECIAL if its SINGLESUM is 4 or 7. For example, 4 and 7 are SPECIAL, as is 133 because 1+3+3=7.

(c) Is 4444 SPECIAL?

$4+4+4+4 = 16$
$1+6 = 7$ ✓

Answer: ____Yes____

(d) Find all the SPECIAL numbers between 60 and 80.

starting with 6:
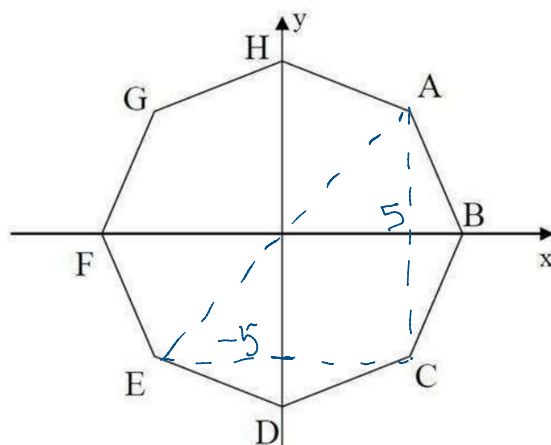digits add up to 7 or 13 (can't add up to 16)
→ 61, 67

starting with 7:
digits add up to 13 or 16
→ 76, 79

Answers: ____61,67,76,79____

12. The diagram shows a regular octagon with axes at its centre.

The line through A and C has equation x = 5

(a) What is the equation of the line through E and C?

Answer: (a) $y = -5$

(b) What is the equation of the line through A and E?

Answer: (b) $y = x$

(c) What is the equation of the line through H and D?

Answer: (c) $x = 0$

13. In this question, we define a new operation in arithmetic, using ☼ as a symbol.

$$a ☼ b = ab + a - b$$

For example, $3 ☼ 7 = 21 + 3 - 7 = 17$

(i) Calculate $5 ☼ 2$

$$10 + 5 - 2$$

Answer: (i) ___13___

(ii) Calculate $3 ☼ ½$

$$1\frac{1}{2} + 3 - \frac{1}{2}$$

Answer: (ii) ___4___

(iii) Solve the equation $x ☼ 5 = 8$

$$5x + x - 5 = 8$$
$$6x = 13$$

Answer: (iii) x = ___$\frac{13}{6}$___

Now check through your work carefully!