



THE PERSE
SCHOOL
CAMBRIDGE

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?

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

Answer: 24

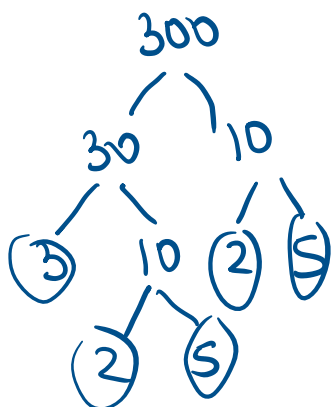
3. (a) Find the value of $2^3 \times 5^2$

$$8 \times 25$$

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) $2^2 \times 3 \times 5^2$



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

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

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

Answer: 2.9×10^5 mm

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

$$\downarrow \times 3$$

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

$$7x = 84$$

Answer: $x =$ 12

6. Calculate 5.06×7.2

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

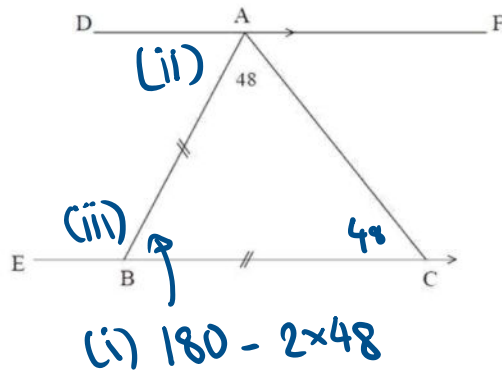
Answer: 84°

(ii) Angle BAD *same as ABC*

Answer: 84°

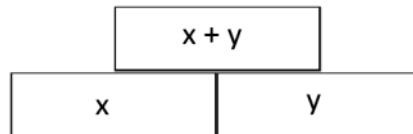
(iii) Angle ABE *$180 - 84$*

Answer: 96°

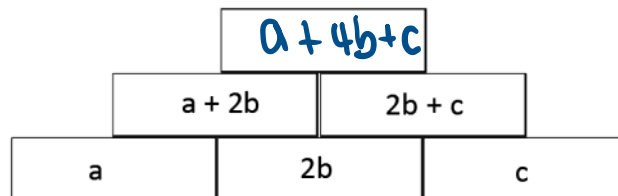


9. In these walls, the value of each brick is made by adding the value of the two bricks below it.

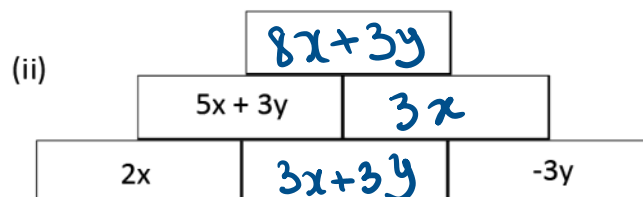
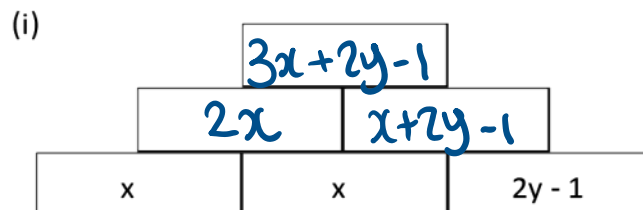
i.e.



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



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



10. Calculate each of the following [leave fractions in their lowest form]

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

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

$$(b) \quad \frac{3}{4} - \frac{1}{4} \times \frac{2}{5} = \frac{3}{4} - \frac{1}{10} = \frac{15}{20} - \frac{2}{20} = \frac{13}{20}$$

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

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

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:

$$2+4+8+2 = 16 \text{ then } 1+6=7$$

(a) Write down the SINGLESUM of 998.

Answer: 8

$$\begin{aligned} 9+9+8 &= 26 \\ 2+6 &= 8 \end{aligned}$$

(b) Find an odd 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?

$$\begin{aligned} 4+4+4+4 &= 16 \\ 1+6 &= 7 \checkmark \end{aligned}$$

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

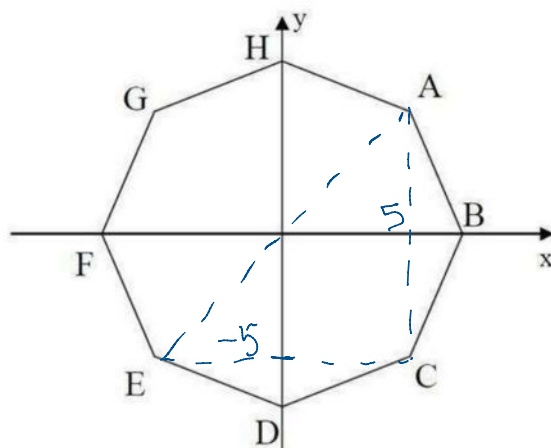
Answers: 61, 67, 76, 79

starting with 7:

digits add up to 13 or 16

→ 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 \odot as a symbol.

$$a \odot b = ab + a - b$$

For example, $3 \odot 7 = 21 + 3 - 7 = 17$

(i) Calculate $5 \odot 2$

$$10 + 5 - 2$$

Answer: (i) 13

(ii) Calculate $3 \odot \frac{1}{2}$

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

Answer: (ii) 4

(iii) Solve the equation $x \odot 5 = 8$

$$\begin{aligned} 5x + x - 5 &= 8 \\ 6x &= 13 \end{aligned}$$

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

Now check through your work carefully!