1. Work out.

$$1\frac{1}{10} - \frac{2}{5} \div \frac{3}{7}$$

.... **[4]**

2. Work out the exact value of *x* in this triangle.
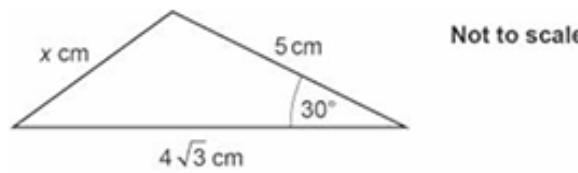
x = ...**[4]**

3(a). 140 and 308 are written below as the product of their prime factors.

$140 = 2^2 \times 5 \times 7$ $308 = 2^2 \times 7 \times 11$

Work out the highest common factor (HCF) of 140 and 308.

....**[2]**

(b). A six-digit passcode is created using the lowest common multiple (LCM) followed by the highest common factor (HCF) of two numbers.
The two numbers chosen are 140 and 308.

   i.   To try and find the passcode, a computer hacker multiplies the highest common factor (HCF) of 140 and 308 by 11 and uses this as the lowest common multiple (LCM) in the passcode.
   The computer hacker's passcode is incorrect.

       Write down the omission in the computer hacker's method.

---**[1]**

   ii.   Work out the correct six-digit passcode.

....**[2]**

4. Work out the exact value of x in this triangle.
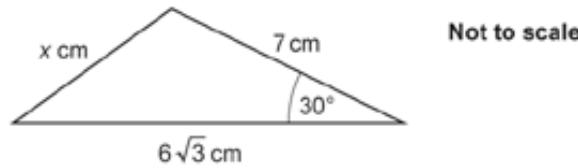
$x =$ .... **[4]**

5(a).

198 and 495 are written below as the product of their prime factors.

$198 = 2 \times 3^2 \times 11$ $495 = 3^2 \times 5 \times 11$

Work out the highest common factor (HCF) of 198 and 495.

.... **[2]**

(b). A five-digit passcode is created using the lowest common multiple (LCM) followed by the highest common factor (HCF) of two numbers.
The two numbers chosen are 198 and 495.

   i.　To try and find the passcode, a computer hacker multiplies the highest common factor (HCF) of 198 and 495 by 5 and uses this as the lowest common multiple (LCM) in the passcode.
       The computer hacker's passcode is incorrect.

       Write down the omission in the computer hacker's method.

       _____**[1]**

   ii.　Work out the correct five-digit passcode.

                                                  .... **[2]**

6. Work out.

$$1\frac{5}{6} - \frac{2}{3} \div \frac{3}{4}$$

                                                  .... **[4]**

7. Write 90 as a product of its prime factors.

.... **[2]**

8. Eight consecutive numbers are written in ascending order in this grid, starting from the top and working left to right.
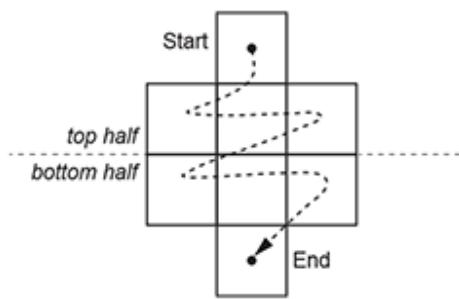
Kareem writes the numbers 5 to 12 in the grid.
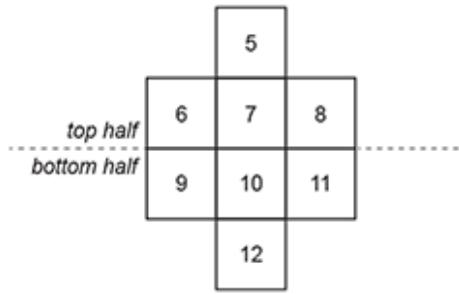
Show that for Kareem's grid, the sum of the numbers in the top half of the grid is 16 less than the sum of the numbers in the bottom half of the grid.

[1]

9. The highest common factor (HCF) of two numbers is 15.
The lowest common multiple (LCM) of the same two numbers is 210.
The two numbers are **not** 15 and 210.

Find the two numbers.

………………….… and ……..……………… **[3]**

10(a). Show that 85 is **not** a prime number.

_____**[1]**

(b).

   i.   5000 and 1750 are written below as the product of their prime factors.

      $5000 = 2^3 \times 5^4$

      $1750 = 2 \times 5^3 \times 7$

      Find the highest common factor (HCF) of 5000 and 1750.

………………………………………… **[2]**

   ii.   Write 2×10^9 as a product of its prime factors.

………………………………………… **[2]**

11(a). Beth is asked to write 518 400 000 as a product of prime factors in index form.
Beth writes

$518\ 400\ 000 = 2^6 \times 3^4 \times 10^5$.

Explain Beth's mistake.

_____**[1]**

(b). Charlie sketches this quadratic graph.

Not to scale
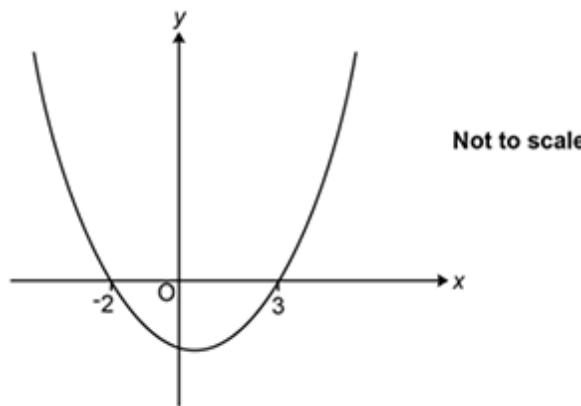
Charlie says

The *y*-intercept is ⁻6.

Write 518 400 000 as a product of prime factors in index form.

.... **[2]**

(c). You are given that 176 000 = $2^7 \times 5^3 \times 11$.

Find the highest common factor (HCF) of 518 400 000 and 176 000.

.... **[2]**

12. Calculate.

$$\frac{392}{3.5^2} - \frac{6.4 + 12.2}{7.4 - 5.8}$$

…….……….…………………… **[2]**

13. Kai is given this question.

> Write 60 as a product of prime factors.
> Give your answer in index form.

Kai's answer is $1 \times 2^2 \times 3 \times 5$.

Is Kai correct?
Explain your answer.

_____**[1]**

14(a). Calculate.

$(5^3 + 6)^2$

…….…………….……………… **[1]**

(b). $\sqrt{\dfrac{8.9^2 + 1.4^2}{5.5 - 3.1}}$

Write your answer correct to **3** significant figures.

…….…………….……………… **[3]**

15. Write 60 as a product of its prime factors.

…... **[2]**

16(a). Show that 95 is **not** a prime number.

_____

---**[1]**

(b).

   i.   2000 and 8750 are written below as the product of their prime factors.

       $2000 = 2^4 \times 5^3$
       $8750 = 2 \times 5^4 \times 7$

       Find the highest common factor (HCF) of 2000 and 8750.

.... **[2]**

   ii.   Write 2×10^{12} as a product of its prime factors.

.... **[2]**

17. The highest common factor (HCF) of two numbers is 14.
The lowest common multiple (LCM) of the same two numbers is 210.
The two numbers are **not** 14 and 210.

Find the two numbers.

.... and .... **[3]**

18. Calculate.

$$\frac{270}{2.5^2} - \frac{4.6 + 17.2}{8.4 - 6.8}$$

.... **[2]**

19(a). Blake is asked to write 15 552 000 000 as a product of prime factors in index form.
Blake writes

$15552000000 = 2^7 \times 5^6 \times 6^5$.

Explain Blake's mistake.

_____

_____

[1]

(b). Write 15 552 000 000 as a product of prime factors in index form.

.... **[2]**

(c). You are given that $140\ 0\ 00 = 2^5 \times 5^4 \times 7$.

Find the highest common factor (HCF) of 15 552 000 000 and 140 000.

.... **[2]**

20. Azmi is given this question.

> Write 40 as a product of prime factors.
>   Give your answer in index form.

Azmi's answer is 2x2x2x5.

Is Azmi correct?
Explain your answer.

[1]

21(a). Fountain A squirts water every 24 minutes.
Fountain B squirts water every 42 minutes.
They squirt water together at 15:19.

Find the next time they squirt water together.

.... **[4]**

(b). A school sends 60 students from Year 8 and 105 students from Year 9 to a museum.

The school divides these students into groups using the following rules.

•   The groups must all be the same size.
•   All students in any group must be from the same year.
•   There should be as few groups as possible.

Find the size of each group and the total number of groups.

Size of each group = ...
Total number of groups = ... [4]

22(a). Calculate ($6^2 + 5^3$)

.... **[1]**

(b). Calculate $\sqrt{\dfrac{8.4^2 - 1.9^2}{2.5 + 5.7}}$

Write your answer correct to **3** significant figures.

....**[3]**

END OF QUESTION PAPER