First name	
Last name	
School	

CASE

MATHEMATICS

ISEB
Independent Schools Examinations Board

Specimen Paper

Date

Time allowed: 90 minutes

Instructions

There are two sections: Section A and Section B.

Answer **all** the questions in Section A.

Attempt as many questions in Section B as you can.

Questions may be answered in any order.

You may **not** use a calculator for this examination.

Show all your working.

Concentrate on complete solutions to questions rather than fragmentary answers.

Diagrams are **not** draw to scale unless otherwise specified.

Final answers should be double-underlined and must contain correct units where necessary.

SECTION A

(40 marks)

Answer ALL the questions in this section.

1. Write

   i) $\frac{7}{12}$ as a percentage

   ii) $\frac{7}{120}$ as a decimal

[4]

2. Calculate

   i) $\frac{3}{2} - \frac{1}{3} \div \frac{1}{2}$

   ii) 10% of 20% of 30% of 50% of 1200

[4]

3. Simplify

   i) $3p(2p - 4r) - 4r(r - 2p)$

   ii) $6a^2b \times (2ab)^2$

   iii) $(2xy^2)^3 \div (3x^2y)^2$

[6]

4. If $a = 12$, $b = 3$ and $c = -4$, find the value of

i) $6a - 5bc$ ii) $a^2 + 2b^2 - c^2$ iii) $\frac{a^b b^a}{c^3}$

[6]

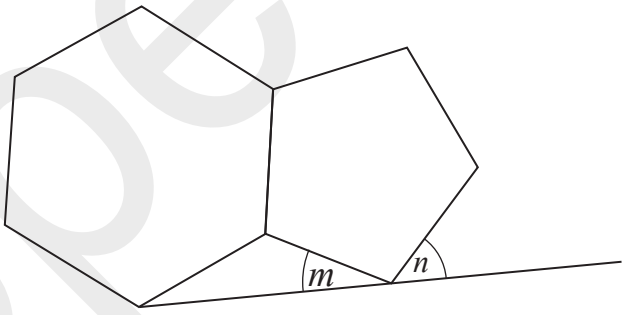
5. Use the result **34 × 825 = 28 050** to write down the value of

i) 3.4 × 82.5 ÷ 2 ii) 28 084 ÷ 34 (iii) 34 × 165

[3]

6. The diagram shows a regular pentagon touching a regular hexagon.

Calculate the size of the angles marked m and n



[6]

7. i) Write 54 and 30 each as the **products of prime factors**.

ii) Work out the **lowest common multiple** of 30 and 54

iii) What is the smallest number you need to multiply the product of 30 and 54 by to give a square number?

[6]

8. Look at the sequence 5, 13, 21, 29, ...

Which term in the sequence has a value of 613?

[5]

SECTION B

(60 marks)

Attempt as many questions as you can in this section.

1. a) Work out **as simply as possible**

i) $15 - 16 + 17 - 18 + 19 - 20 + 21 - 22$

ii) $97 \times 48 + 48^2 - 48 \times 45$

iii) $\dfrac{51 + 49 \times 51}{20 \times 5.1}$

b) In May, Jacques spent 80% of his monthly salary and saved the rest.

In June, his monthly salary increased by £800, and he saved 15% of his new monthly salary.

If he saved the same amount in May and in June, find his new monthly salary.

[9]

2. i) Solve the simultaneous equations

$2x + y = 9$

$5x - y = 17$

ii) Use your answers to part (i) to write down all the solutions to these simultaneous equations:

a) $2\sqrt{c} + \sqrt{d} = 9$

$5\sqrt{c} - 3\sqrt{d} = 17$

b) $2r - s = 27$

$5r + 3s = 51$

[6]

3. i) Write down the next two terms in each of the following sequences:

a) 1 , 8 , 27 , 64 , ... , ...

b) 3 , 12 , 27 , 48 , ... , ...

ii) Use your answers to part (i) to write down the next two terms in these sequences.

a) $^{-}2$, $^{-}4$, 0 , 16 , ...

b) 3 , $\frac{3}{2}$, 1 , $\frac{3}{4}$, ...

iii) In the sequence in (ii)(b), what is the value of the first term that is less than $\frac{1}{20}$?

[8]

4. Lucy drives her car from *A* to *B* at a speed of 30 km/h for 6 minutes.
She then drives from *B* to *C* at a speed of 90 km/h for 12 minutes.

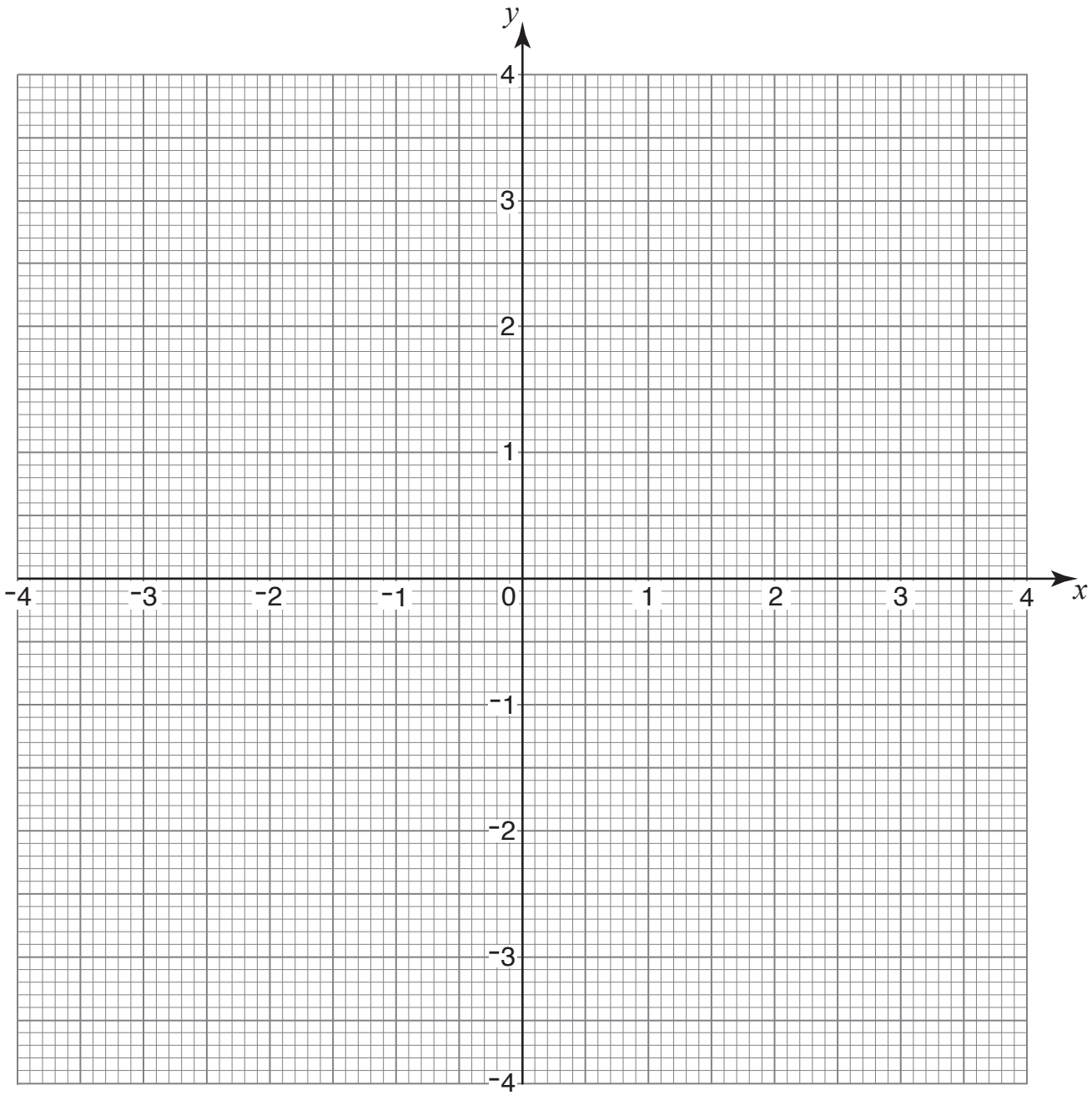
i) Calculate the mean speed of Lucy's car in km/h for the journey from *A* to *B* to *C*.

Lucy now drives her car at 90 km/h from *C* to *D*.

ii) How long will the journey from *C* to *D* take if the car has a mean speed of 75 km/h for the whole journey from *A* to *B* to *C* to *D*?

[7]

5. i) Draw and label the graph of $y = 4 - \frac{x^2}{2}$ on the axes below.



ii) Reflect the graph of $y = 4 - \frac{x^2}{2}$ in the line $y = -x$

The two curves intersect at (-2, 2).

iii) At which other point do the curves cross? Answer: .....

[8]

6. Steven has a fair die whose six faces are numbered 2, 2, 4, 4, 4 and 6

Claude has a fair die whose six are numbered 1, 3, 3, 3, 5, and 5

i) If they each throw their die, what is the probability that Steven will throw a higher score than Claude?
You may wish to complete the table showing when Steven's score is higher than Claude's.

Claude's score

>	1	3	3	3	5	5
2						
2	✓					
4						
4				✓		
4						
6			✓			

Steven's score

key: 2 > 1 ✓
4 > 3 ✓
6 > 3 ✓

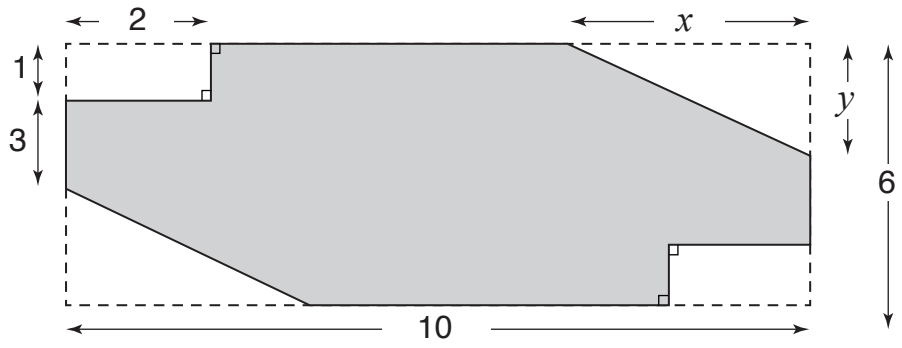
ii) Alter one of the numbers on one of the dice so that each boy has an equal chance of throwing the higher score.

(*You can only use numbers 1, 2, 3, 4, 5 or 6*)

Answer: .....'s numbers are now ....., ..., ..., ..., ..., ...

[6]

7. A rectangle, 10cm by 6cm, has its four corners cut off to form a shape with a rotational symmetry order 2



Lengths are marked in cm

i) Calculate the value of y

ii) Calculate the value of x if the logo has $\frac{5}{6}$ of the area of the original rectangle.

iii) Calculate the perimeter of the logo, leaving your answer in the form $a + b\sqrt{c}$ where a, b and c are whole numbers.

iv) The logo is enlarged and its new area is 450 cm^2.

Calculate the new perimeter.

[8]

TURN OVER FOR QUESTION 8

8. The operation @ is defined as

$$x \ @ \ y = x + y - xy$$

i) Calculate

a) $7 \ @ \ 11$

b) $(3 \ @ \ 4) \ @ \ 5$

ii) Simplify the expression

$a \ @ \ (a \ @ \ a)$

[8]

(Total marks for Section B: 60)

(Total marks for paper: 100)