13+ Mathematics Examination 2019

13+ Mathematics Examination

Remember that you must **not** use a calculator to answer any question in this examination, but it is very important to show your working as you may get marks for this.

You do not need any geometry equipment.

The maximum marks for each question are shown on the right-hand side of the paper. There are 18 pages of questions. The maximum total for this paper is 100 marks.

You have 90 minutes for this paper.

Name …………………………………… Date of Birth …………………………………...

Section A Mathematical Skills	Section B Problem Solving	TOTAL
40	60	100

1.

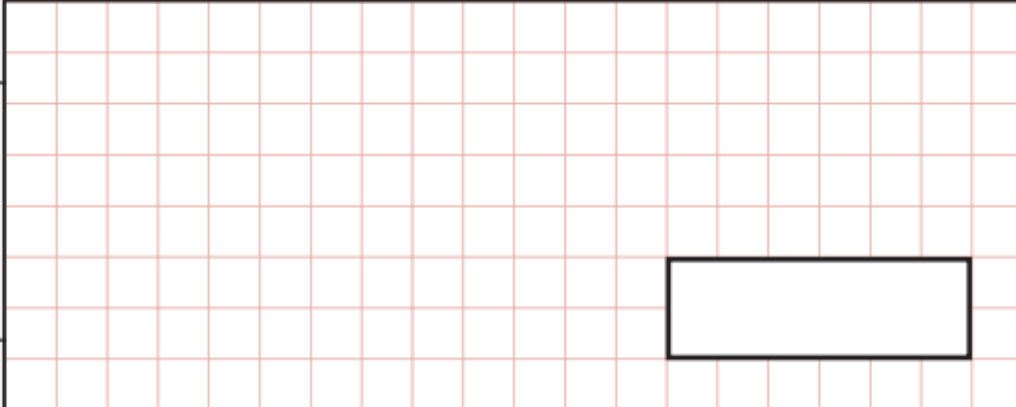$$\frac{2}{3} + 3\frac{2}{5} + \frac{1}{10} =$$

Show your method

(3)

2.   Calculate

$$4\frac{1}{6} \div 2\frac{1}{2} =$$

Show your method

(3)

3. Use the fact that $36 \times 42 = 1512$ to write down each of the following

$$18 \times 42 =$$

Show your method

(1)

(b) $$3.6 \times 2.1 =$$

Show your method

(2)

(c) $$15.12 \div 0.36 =$$

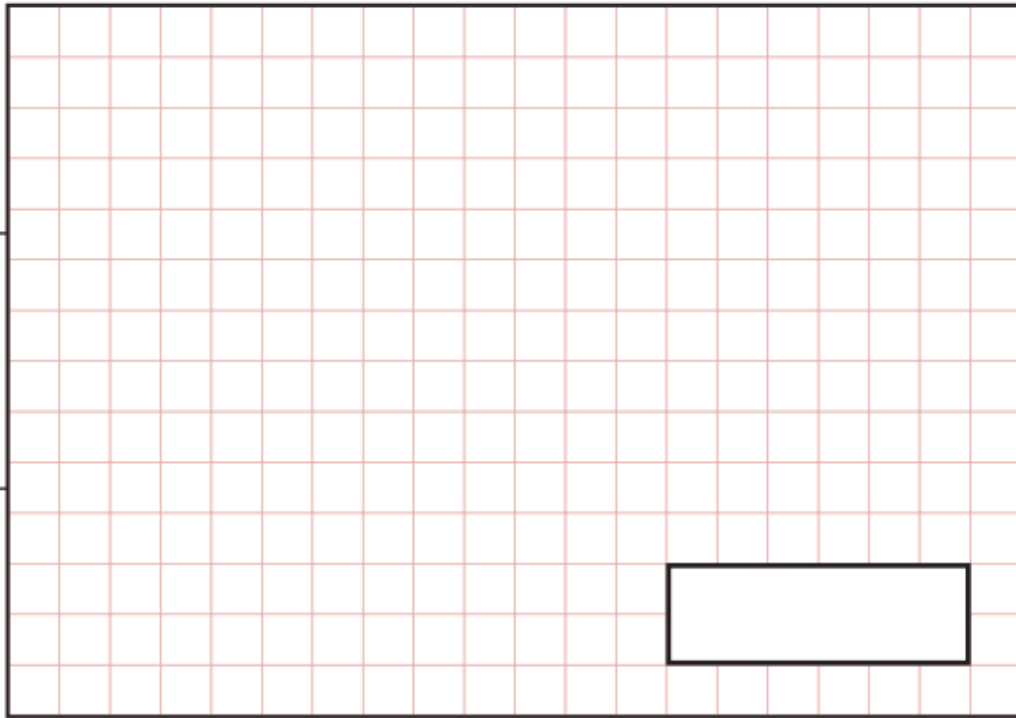Show your method

(2)

(d) $$36 \times 28 + 36 \times 14 =$$

Show your method

(2)

4. (a) Write 1089 as a product of prime factors
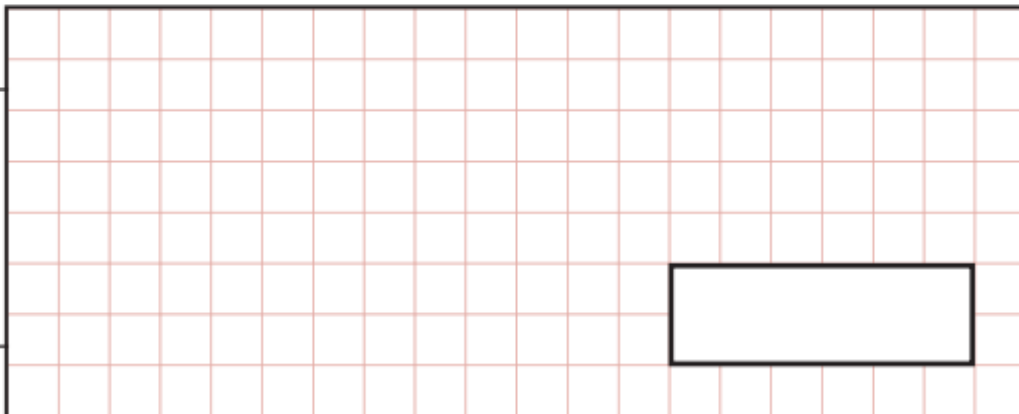
Show your method

(2)

(b) Use your answer to (a) to find $\sqrt{1089}$
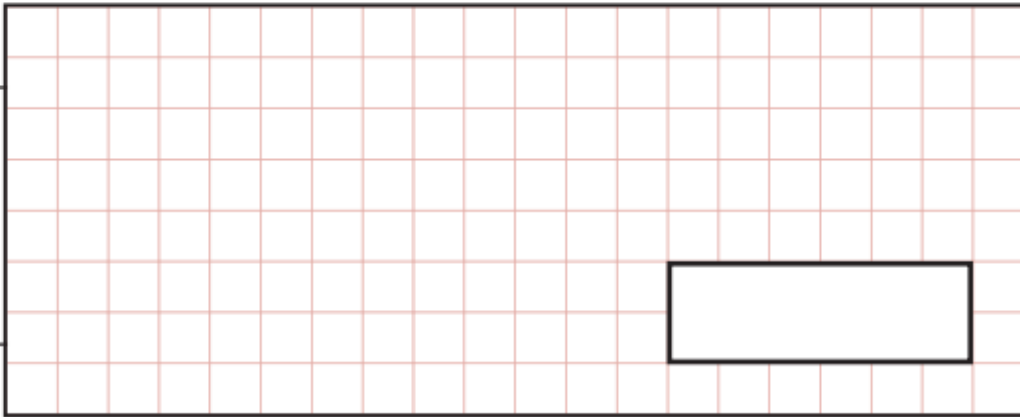
Show your method

(1)

Page Total

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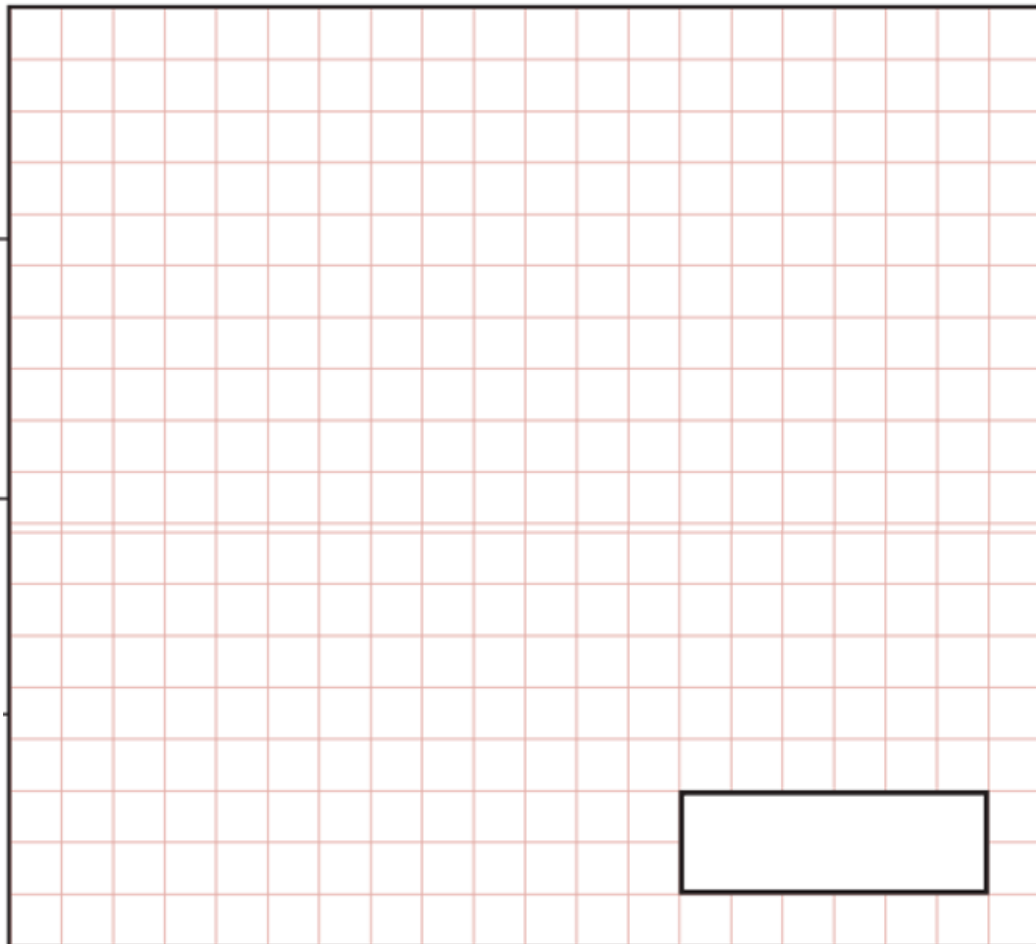# 13+ Mathematics Examination 2019

5.   (a) Increase £170 by 45%

Show
your
method

(2)

(b) A property costing £125000 loses 15% of its value, then gains 20%
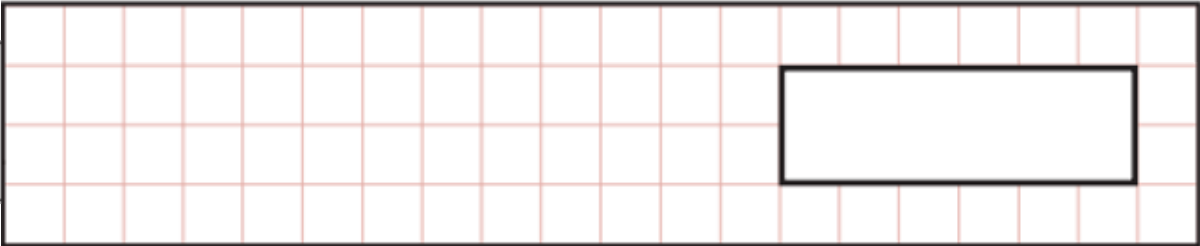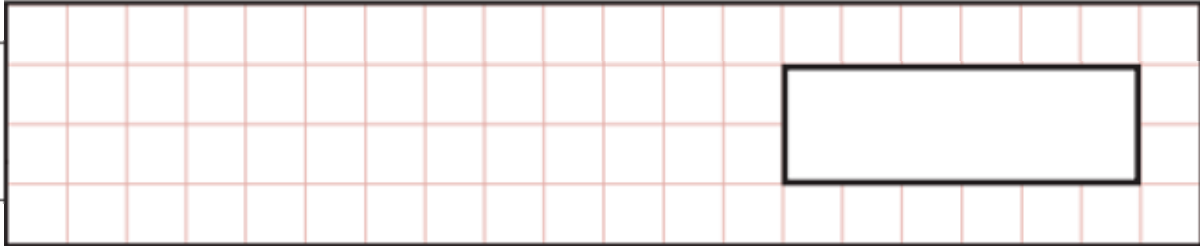What is the final value?

Show
your
method

(4)

Page Total

6

5

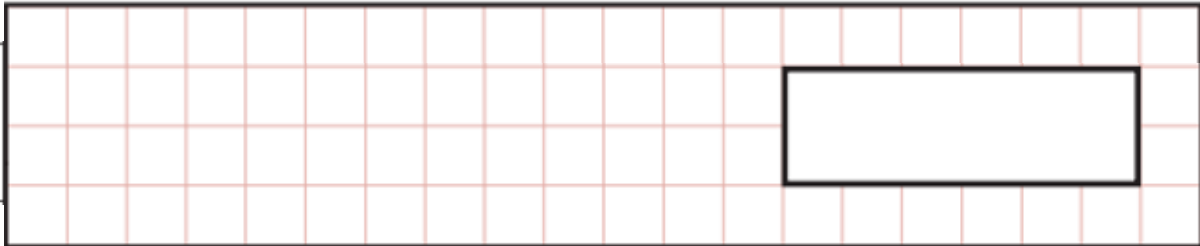6. Simplify the following
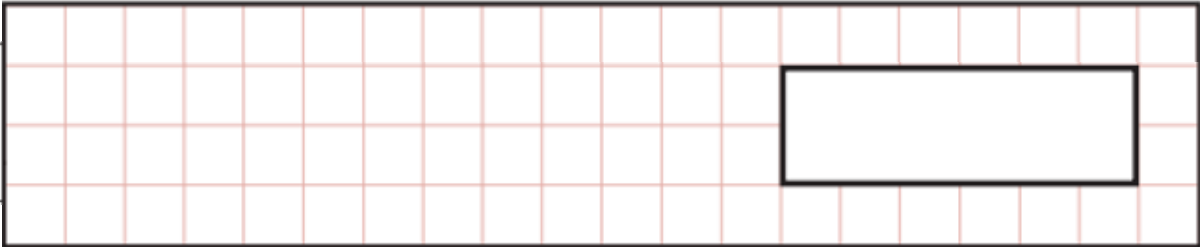
(a) $3x - 5y + 6x - 2y =$

Show your method

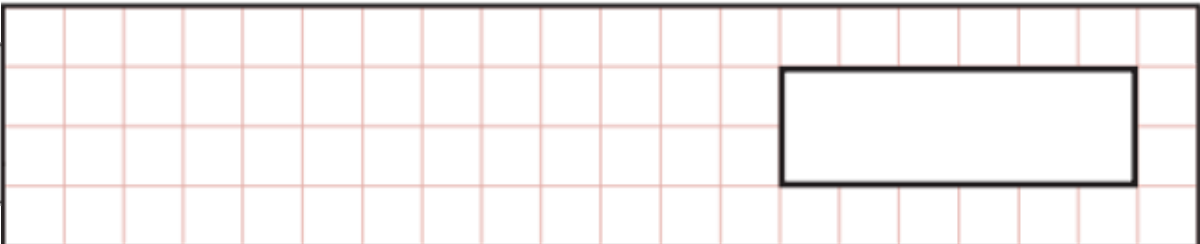(2)

(b) $2c^3 + 6c^3 =$

Show your method

(1)

(c) $2ab^3 \times 5a^2b^2$

Show your method

(2)

(d) $\dfrac{10x^2y^2z}{5x^3z}$

Show your method

(2)

(e) $\left(a^2\right)^3$

Show your method

(1)

Page Total $\dfrac{}{8}$
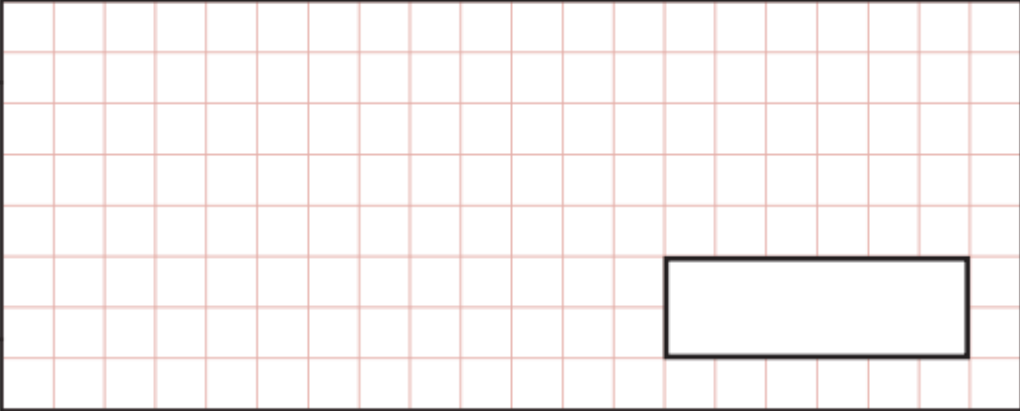
7.   Solve the following equations:

(a) $3x - 7 = -10$
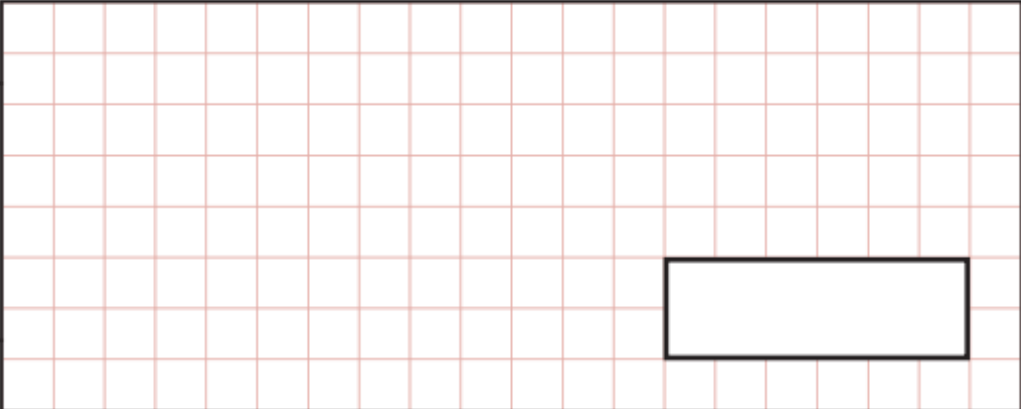
Show your method

(2)

(b) $2(4 - x) = 18$

Show your method

(2)

Page Total

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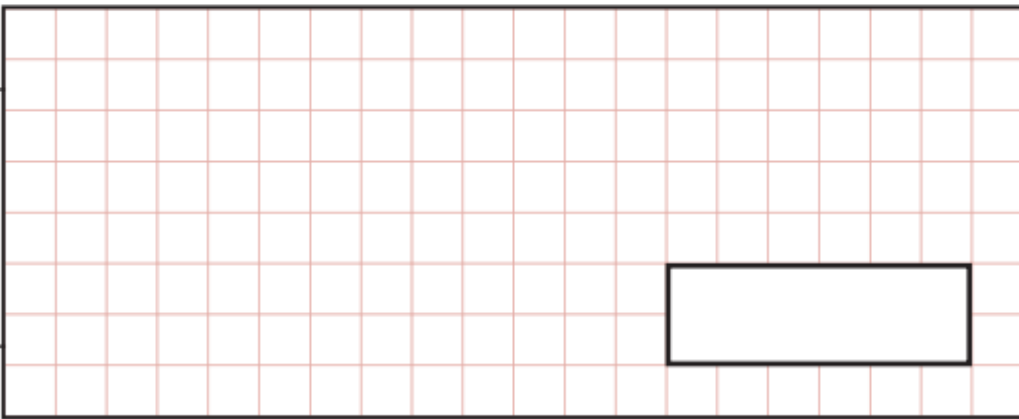
8. Solve the following equations:

(a) $2x - 5 = 11 - 2x$
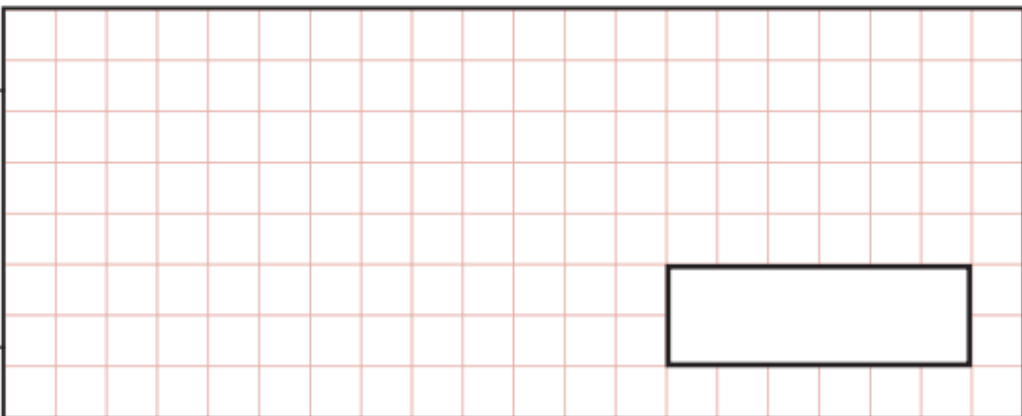
Show your method

(2)

(b) $\dfrac{1}{5} - \dfrac{1}{15} = \dfrac{1}{x}$
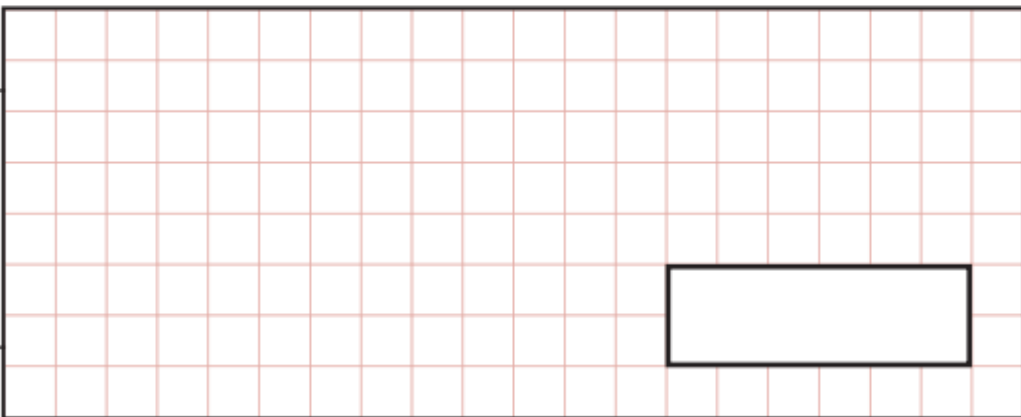
Show your method

(2)

9. Write as a decimal the answer to: $9 + \dfrac{9}{10} - \dfrac{99}{100}$

Show your method
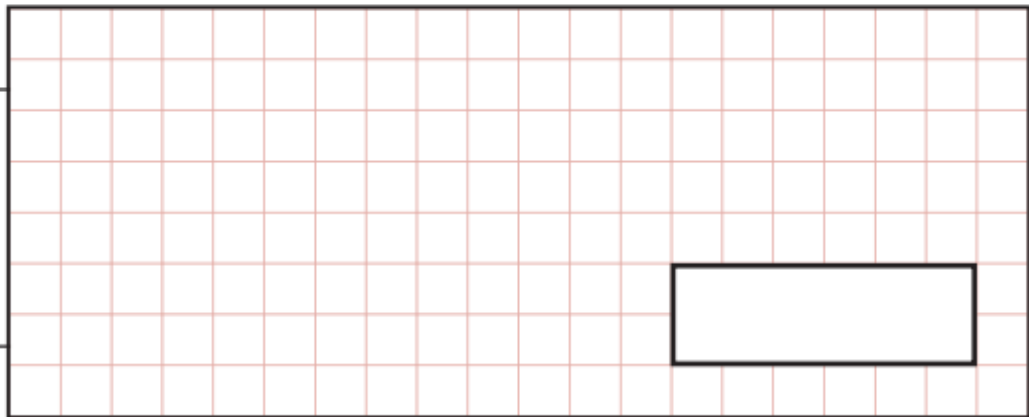
(2)

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SECTION B: PROBLEM SOLVING

10. All Old Mother Hubbard had in her cupboard was a Giant Bear Chocolate bar. She gave each of her children one twelfth of the chocolate bar. One third of the bar was left. How many children did she have?

Show your method

(2)
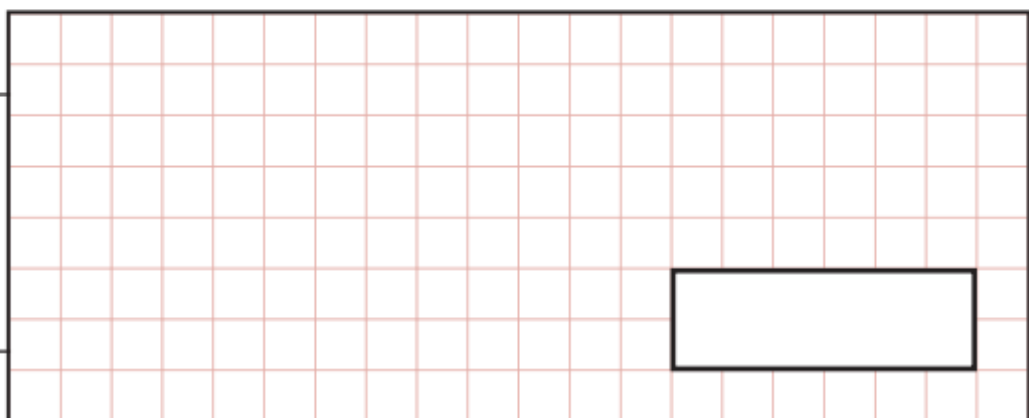
11. What is the sum of the marked angles in the diagram?
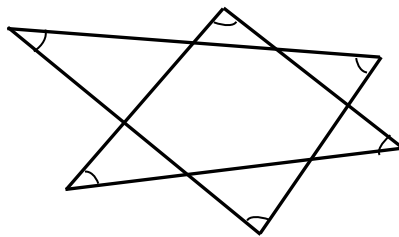
(2)

12. What is the smallest possible difference between two different nine digit integers, each of which includes all of the digits 1 to 9?

Show your method

(2)

13. If ◆ + ◆ = ✚ and ✚ + ◆ = ☐ and ● = ◆ + ✚ + ☐, how many ◆ are equal to ●?

Show your method

(3)

14. I am given the same amount of pocket money each week. One week I bought four tennis balls and had 27p left over. The next week I bought two tennis balls and had £1.51 left over. How much do tennis balls cost? How much pocket money do I get each week?

Show your method

Tennis Balls £

Pocket Money £

(5)

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15.   (a) Calculate the next two terms of the sequence

$$3, 8, 13, 18 \quad \boxed{\text{........} \, , \text{...........}}$$

(1)

(b) Write down an expression for the nth term of this sequence.

Show your method

(2)

(c) What is the value of the 100th term?

Show your method

(2)

(d) Is 99 a term of the sequence? Explain your answer.

Show your method

(2)

16.   Gill leaves Lille by train at 09:00. The train travels the first 27km at 96km/h. It then stops at Lens for 3 minutes before travelling the final 29km to Lillers at 96km/h. At what time does Gill arrive at Lillers?

Show your method

(4)

17. A school is holding a tombola fund raising event. Winning tickets will have a number ending in 0 or 5. Five hundred tickets are sold and there are one hundred prizes.

(a) What is the probability of winning a prize if I buy one ticket?

(1)

(b) How many tickets should I buy to be sure of getting a prize?

(1)

(c) After 1 hour 350 people have bought tickets and 40 prizes have been won. What is the probability of winning a prize now?

Show your method

(2)

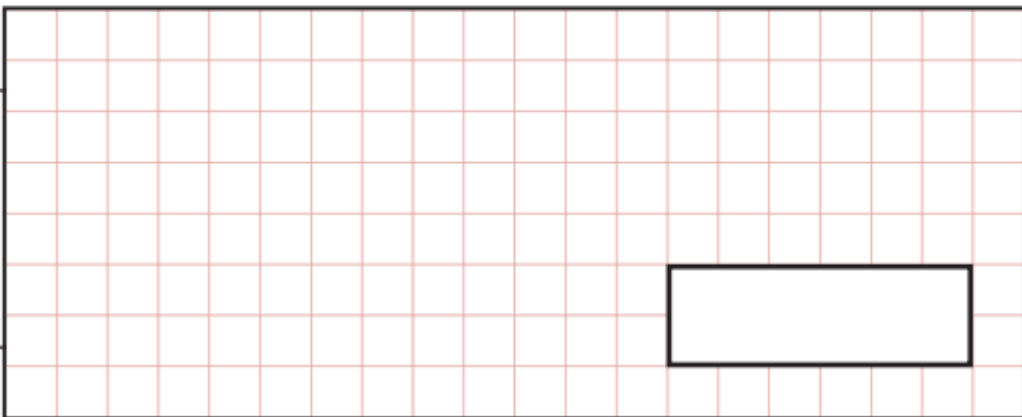18. What is the mean of $\dfrac{2}{3}$ and $\dfrac{4}{9}$

Show your method

(2)

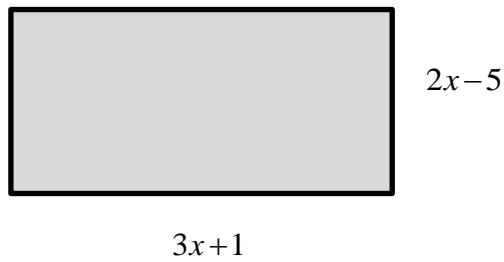Page Total $\dfrac{}{6}$

19. An empty water tank measuring 2m by 1.2m by 80cm needs to be filled using a 4 litre bucket. How many bucketfuls does it take? (1 litre = 1000cm³)
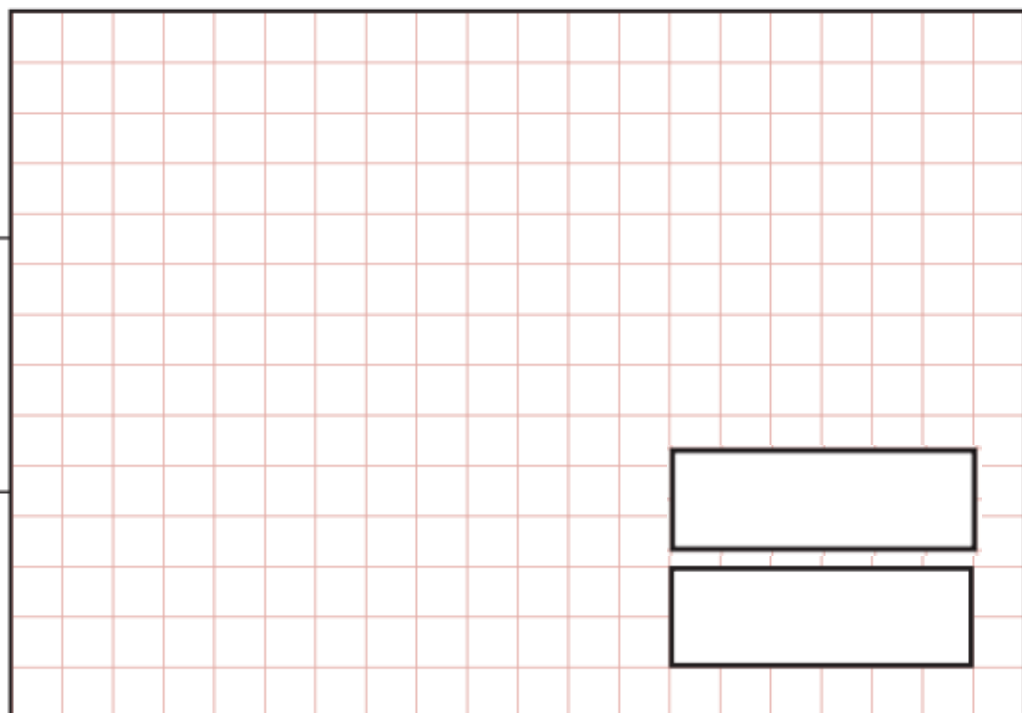
Show your method

(4)

20. The perimeter of this rectangle is 52cm.

$2x-5$

$3x+1$

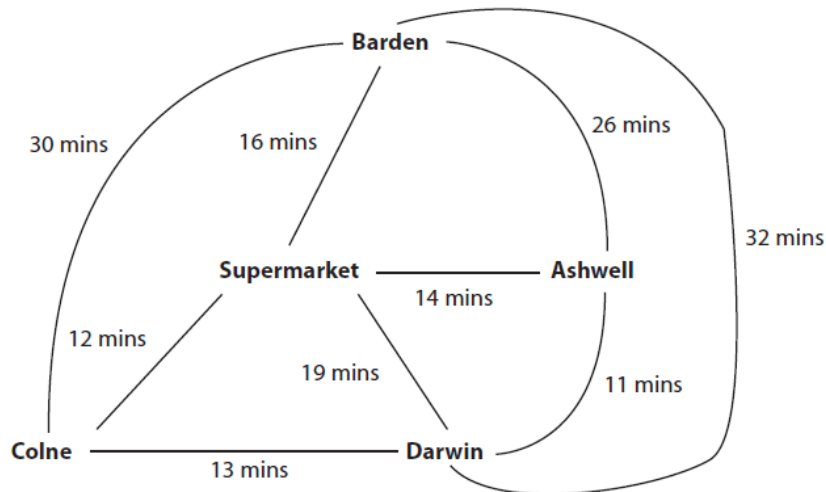Form an equation in terms of x and solve it to find the length and width of the rectangle.

Show your method

(4)

Page Total

$\overline{8}$

21. If you double the age that I will be in five years' time you will get my mother's age now. My mother is 38. How old am I? (Hint: let my age be x years.)

Show your method

(3)

22. Phil needs to make deliveries to Ashwell, Barden and Colne.
He uses this diagram to help him plan his route.

Barden

30 mins   16 mins   26 mins

32 mins

Supermarket —— Ashwell
14 mins

12 mins

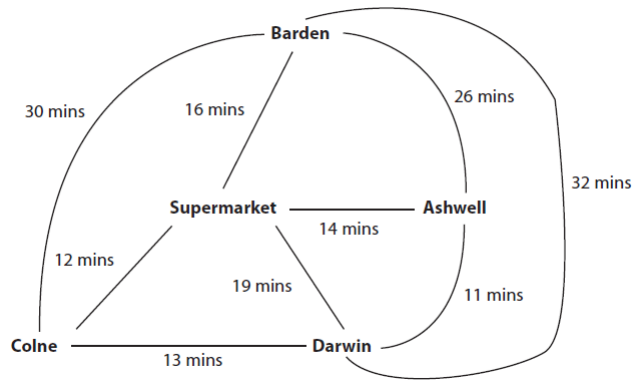19 mins   11 mins

Colne ——— Darwin
13 mins

The route must start and finish at the supermarket.
Phil wants to use the route that takes the shortest time.

Plan the route for Phil that takes the shortest time.
Give the time taken for this route in hours and minutes.

Use the box below and overleaf to show clearly how you get your answer.

Page Total

$\frac{-}{3}$

3

Barden

30 mins

16 mins

26 mins

32 mins

Supermarket —————— Ashwell

14 mins

12 mins

19 mins

11 mins

Colne ————————— Darwin

13 mins

(3)

23. A straight line goes through the points (2,8) and (4,14)

The equation of this straight line is $y = 3x + 2$

    i. At which point does this line pass through the y-axis?

(1)

    ii. What is the gradient of this line?

(1)

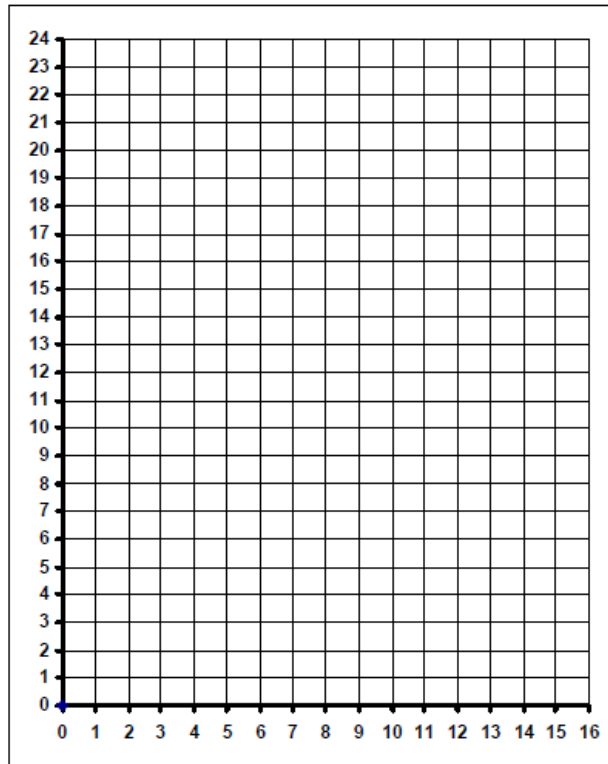   iii. Does the point (7,20) lie on this line? Explain.

Explanation:

_____

_____ (2)

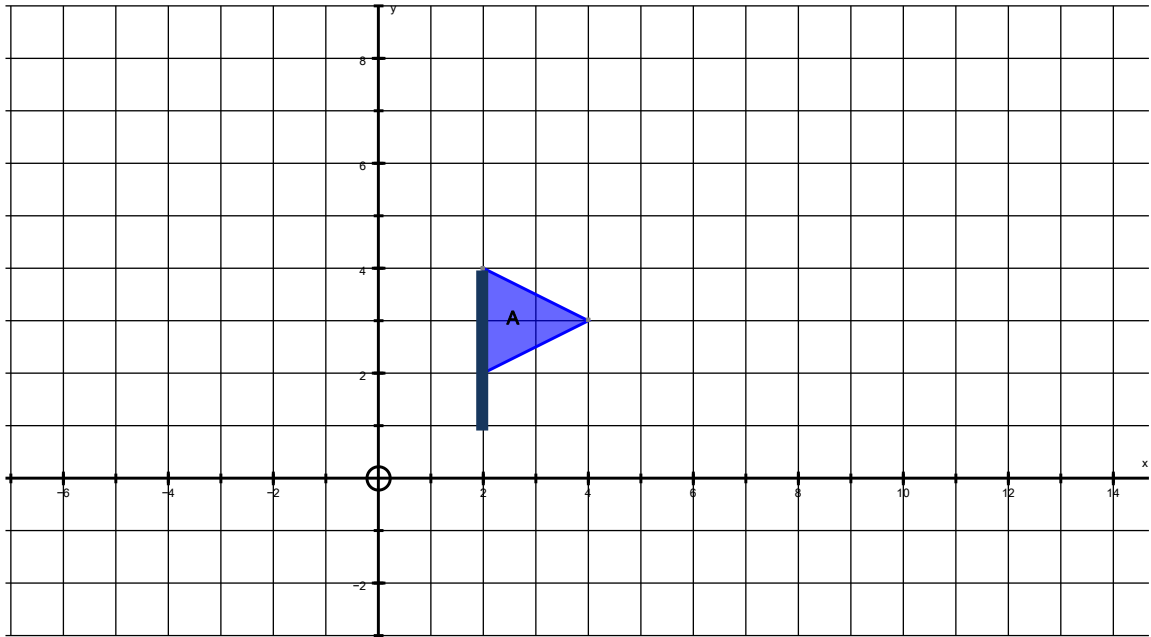   iv. Give the coordinates of another point on the line $y = 3x + 2$

(,   )

(1)

    v. On the grid below draw the line $y = 3x + 2$

(1)

24. Enlarge shape **A** with a scale factor of 2, from the point (0,0). Label the image **B**. (1)

a. Translate shape **A** by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. Label your image **C**. (2)

b. Describe fully the transformation that will map shape B back onto shape A.

_____

_____

(2)

Page Total

$\dfrac{}{5}$

25.   The rule for a sequence of number pairs is

$(x, y) \rightarrow (x+y, x-y)$

So, for example, $(3,5) \rightarrow (8,-2)$, because $3+5=8$ and $3-5=-2$

Part of a sequence obeying this rule is shown below. Fill in the missing number pairs.

$$(....,....) \rightarrow (1,2) \rightarrow (3,-1) \rightarrow (....,....) \rightarrow (....,....)$$

(4)

Page Total

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4

End of Exam