

**13+ Mathematics**  
**The Perse School Entrance Test**  
**Specimen Paper 3**



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**Time allowed: 1 hour**

Instructions to candidates:

1. Show all working - you may receive marks for correct working even if your final answer is wrong.
2. Answer as many questions as you can, in any order. You are not expected to finish the paper.
3. Do not spend too long on any one question - if you get stuck, move on to the next.
4. Answers and working should be written on the exam paper in the spaces provided.
5. Calculating aids are **NOT** permitted.

1. Solve  $17 - x = 1 + 3x$

Answer:  $x =$  \_\_\_\_\_

2. Brian was reading a novel. He said, "If I take the sum of the number of the page I'm on with the number of the page on its right, I get 425. Which page is Brian on?"

3. Calculate (a)  $62.73 + 5.1$  Answer: \_\_\_\_\_

(b)  $7.21 \times 8.3$  Answer(a): \_\_\_\_\_

(c)  $0.1 - (0.1)^2$  Answer(b): \_\_\_\_\_

(d)  $1\frac{1}{2} + \frac{2}{3} \times 1\frac{1}{5}$  Answer(c): \_\_\_\_\_

Answer(d): \_\_\_\_\_

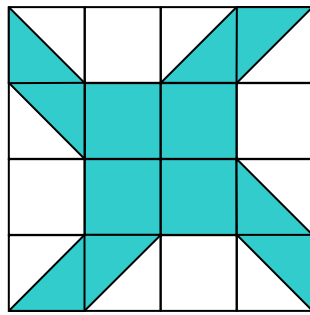
4. Write  $\frac{2}{11}$  as a recurring decimal.

Answer: \_\_\_\_\_

5. A large protozoa is one tenth of a millimetre across.  
Write down this length in metres.

Answer: \_\_\_\_\_ metres

6. The diagram shows squares, each of side 1 cm. Calculate the area shaded.



Answer: Area = \_\_\_\_\_  $\text{cm}^2$

7. What is 5 divided by  $\frac{1}{3}$  ?

Answer: \_\_\_\_\_

8. You are given  $3721 \times 586 = 2180506$   
What is the value of  $2180506 \div 37.21$  ?

Answer: \_\_\_\_\_

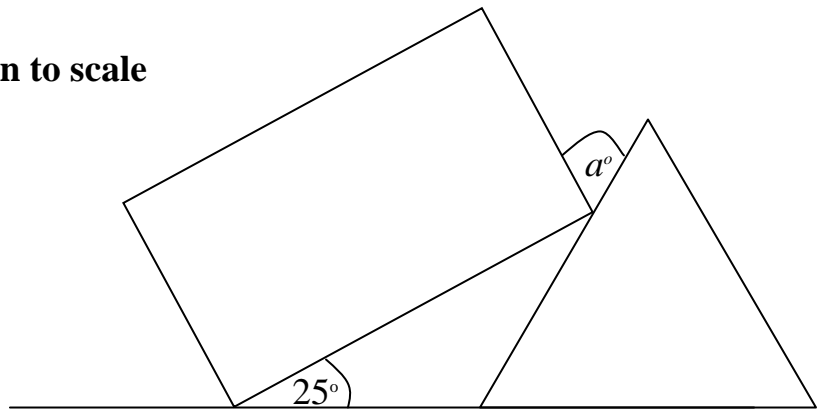
9. What is the value of  $2004^2$  ?

(A) 4016    (B) 41616    (C) 400016    (D) 4000016    (E) 4016016

Answer: \_\_\_\_\_

10. The diagram below shows a rectangle that just touches an equilateral triangle.

**Diagram not drawn to scale**



Work out the size of the angle marked  $a$

Answer:  $a =$  \_\_\_\_\_

11. Simplify as much as possible, each of the following:

(i)  $2x^2 - x - 1 - x^2 - 5x - 3$

Answer (i): \_\_\_\_\_

(ii)  $\frac{20x^6}{5x^4}$

Answer (ii): \_\_\_\_\_

12.  $a = \frac{7}{15}$  On my calculator,  $a$  is shown as 0.4666666667

- (i) Write  $a$  to 3 significant figures

Answer: (i) \_\_\_\_\_

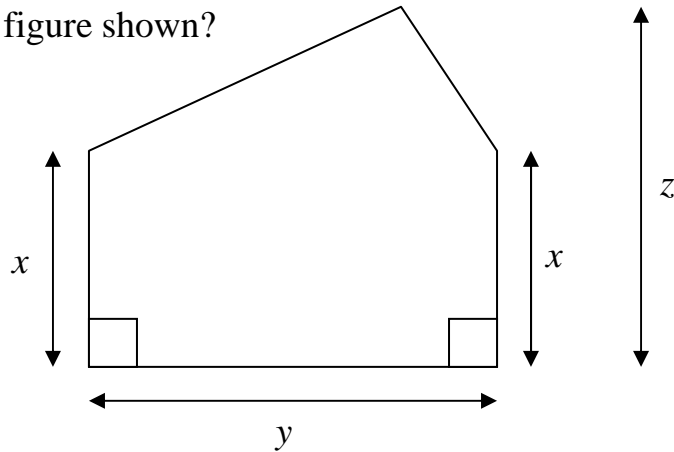
- (ii) Write  $10a$  to 3 decimal places.

Answer: (ii) \_\_\_\_\_

- (iii) Write  $a$  to 12 decimal places.

Answer: (iii) \_\_\_\_\_

13. What is the area of the figure shown?



- A.  $\frac{1}{2}x(z - y)$       B.  $\frac{1}{2}x(z + y)$       C.  $\frac{1}{2}z(x + y)$       D.  $\frac{1}{2}y(x + z)$   
 E.  $\frac{1}{2}y(z - x)$

Answer: \_\_\_\_\_

14. Factorise fully:

(i)  $12x - 24$

Answer: (i) \_\_\_\_\_

(ii)  $2\pi r^2 + 2\pi rh$

Answer: (ii) \_\_\_\_\_

15. Write in standard form:

(i) 20700000

Answer: (i) \_\_\_\_\_

(ii) 0.0000000000605

Answer: (ii) \_\_\_\_\_

16. After training, Simon increased his average speed in the 'Sawston Fun Run' by 25%. By what percentage did his time decrease?

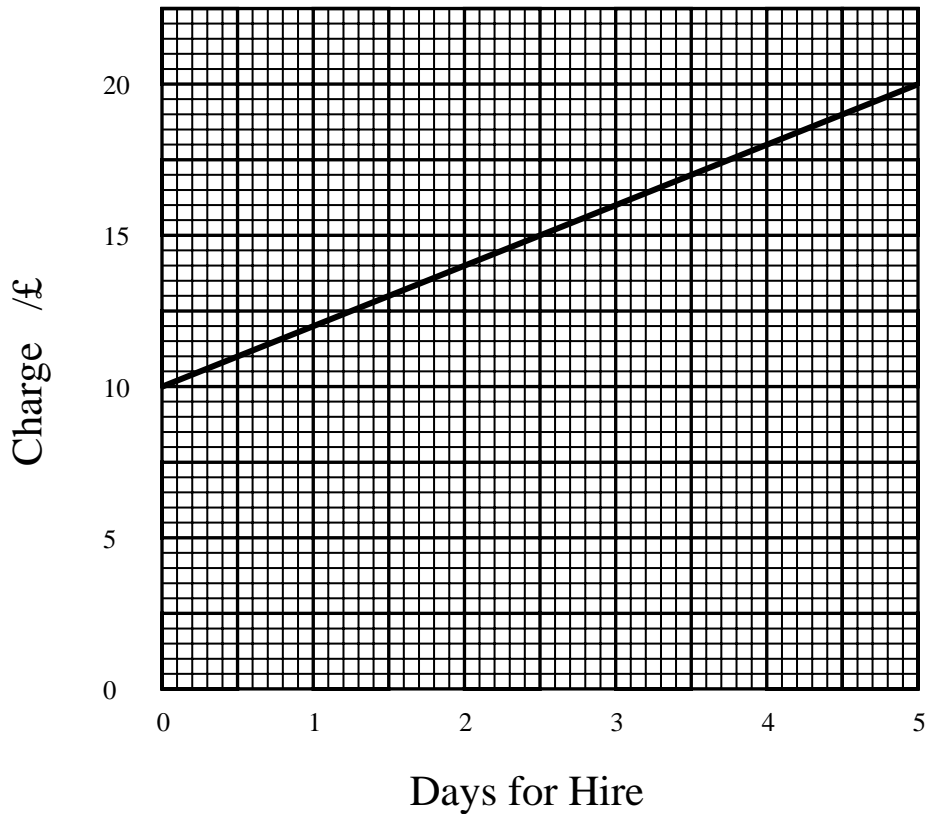
- (A) 50      (B) 30      (C) 25      (D) 20      (E) 10

Answer: \_\_\_\_\_

17. A tool-hire company has a fixed charge of £9 plus £8 per day to hire a tool. If I hire a ladder for  $n$  days, write down a formula (£ $C$ ) for the total hire cost.

Answer:  $C =$  \_\_\_\_\_

A different company represents its charges on the graph shown below. Use the graph to work out the fixed charge and the daily rate.



Answer: fixed charge = £ \_\_\_\_\_

Answer: daily rate = £ \_\_\_\_\_

18. The mean of five numbers 5,  $x$ , 9, 10 and 20 is 10. Find the value of  $x$

Answer:  $x =$  \_\_\_\_\_

19.  $a = 5$ ,  $b = 6$  and  $c = -2$

Find the value of each of the following:

(i)  $3a - 2c$

Answer: (i) \_\_\_\_\_

(ii)  $\frac{2a - b}{a - b}$

Answer: (ii) \_\_\_\_\_

(iii)  $2b^2$

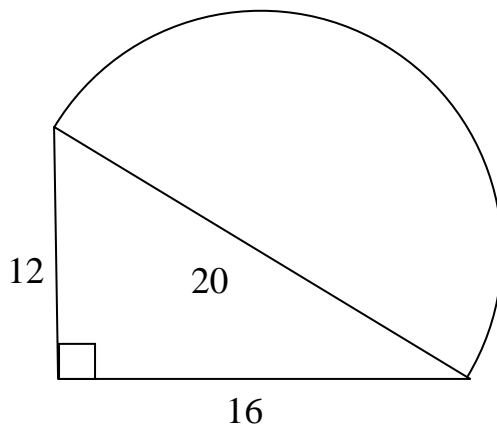
Answer: (iii) \_\_\_\_\_

(iv)  $(b - 2c)^2$

Answer: (iv) \_\_\_\_\_

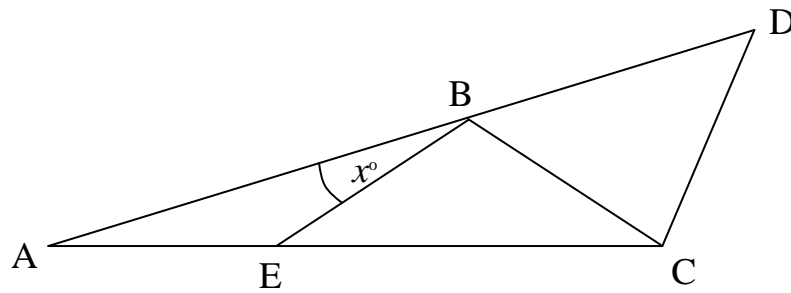
20. The diagram shows a triangle and a semicircle. Calculate its area.

(Take  $\pi = 3.14$ )



Answer: Area = \_\_\_\_\_

21.



The figure (**not drawn to scale**) is such that ABD is a straight line and  $AE = EB = BC = CD$

If  $\angle ABE = x$ , find (in terms of  $x$ )

(i)  $\angle BEC$

Answer: (i) \_\_\_\_\_

(ii)  $\angle DBC$

Answer: (ii) \_\_\_\_\_

(iii)  $\angle BCD$

Answer: (iii) \_\_\_\_\_

If  $\angle ACD = 120^\circ$ , calculate  $x$ .

Answer:  $x =$  \_\_\_\_\_

22. Calculate  $7.59 \div 5.06$

Answer: \_\_\_\_\_



23. I have some rabbits and some rabbit hutches. When I put seven rabbits in each rabbit hutch, one rabbit is left over. If I put nine rabbits in each rabbit hutch, one hutch is left over. How many rabbits and how many rabbit hutches are there?

**[You must show your method to gain full marks for this problem]**



Answer: Number of rabbits = \_\_\_\_\_

Answer: Number of Hutches = \_\_\_\_\_

24. Suppose that  $a$ ,  $b$ ,  $c$  and  $d$  are different positive whole numbers, with  
 $c + b + c + a = 9$ ,  $d + a + c = 10$  and  $b = 1$   
What is  $d$ ?

Answer:  $d =$  \_\_\_\_\_

**Now check through your work carefully!**