The King's School, Canterbury

Entrance Examinations (13+)

2011

Mathematics

One Hour

Answer as many questions as possible, presenting your answers clearly and neatly and showing all relevant working in the spaces provided.

Calculators may be used in any question unless stated otherwise. In a question where a calculator is prohibited, your working must display sufficient detail to show that it has not been used.

There are likely to be more questions on the paper than you can do in the time allowed*. Do not worry about this. If you cannot do a question, leave it and go on to the next. You need to work fast to get to the end of the paper. There are 100 marks in total.*

NAME: .... AGE: ....

PRESENT SCHOOL: ....

| Total: | % |

1. Show that (i.e. demonstrate full working)

(a) $\dfrac{5}{6} - \dfrac{1}{4} = \dfrac{7}{12}$

(b) $\dfrac{22}{7} \times 3\frac{2}{11} = 10$

(c) $\dfrac{21}{32} \div \dfrac{7}{8} = \dfrac{3}{4}$

[Total 7 marks]

2. (a) Change 0.204 to a fraction in its lowest form.

....

[2]

(b) Change 17.5% to a fraction in its simplest form.

....

[2]

[Total 4 marks]

3.   The Great Barrier Reef covers an area of 135,157 square miles on the northeast continental shelf of Australia. The reef system has 3,400 individual reefs; these include 760 fringing reefs that vary in size from 2.5 acres to over 24,710 acres.

What percentage of reefs are fringing reefs?

....
[2]
[Total 2 marks]

4.   Arrange in order of ascending size (smallest first) $\dfrac{1}{125}$,   1.25%,   0.00125, $\dfrac{7}{1000}$

....
[2]
[Total 2 marks]

5.   Find the value of the following when $a = -2$, $c = 5$ and $h = -7$.

(a) $a - c$

....
[1]

(b) $ch^2 - a$

....
[2]

(c) $(ac - h)^2$

....
[2]
[Total 5 marks]

6. Simplify each of the following as much as possible.

(a) $3a - 2a + 5a$

....
[1]

(b) $7x - 2y + 8x + y$

....
[2]

(c) $3p + 4(p + 2)$

....
[2]

(d) $8(k + 3) - 7(2 - k)$

....
[2]

(e) $3w \times 7w^2$

....
[2]

[Total 9 marks]

7. In the Carlsbad Caverns (New Mexico, USA), there can be as many as 1500 bats crammed tightly into five square feet.

(a) How many bats could fit in a space of 20 square feet?

....
[2]

(b) How many bats could fit in a space of 3 square feet?

....
[2]

[Total 4 marks]

8. Ten pupils sit an entrance examination. Here are their percentage scores:

48   52   57   65   70   81   83   90   95   99

(a) Work out the mean score in the examination.

....
[3]

(b) If we also include an eleventh student's score, the mean score for the group rises to 76%. What did this student score in the examination?

....
[3]

[Total 6 marks]

9. Solve the following equations.

(a)

....
[2]

(b)

....
[2]

(c) $4y+7=3(2-y)+9(y+1)$

....
[3]

(d) $\dfrac{2x}{7}+5=11$

....
[3]

[Total 10 marks]

10.   A school has 780 pupils, $\frac{1}{10}$ of which live less than one mile from school.

35% of pupils live between 1 and 2 miles from school.

125 pupils live between 2 and 3 miles from school.

(a) How many pupils live less than one mile from school?

....
[1]

(b) How many pupils live between 1 and 2 miles from school?

....
[2]

(c) What percentage of pupils live between 2 and 3 miles from school?

....
[2]

(d) What percentage of pupils live further than 3 miles from school?

....
[2]

[Total 7 marks]

10.   Mount Cook, now 3,754m high, lost 10m from its peak as a result of a landslide in 1991. What was the percentage decrease in height as a result of the landslide?

....
[2]

[Total 2 marks]

11. Reflect the shaded shape in the line *AB*.
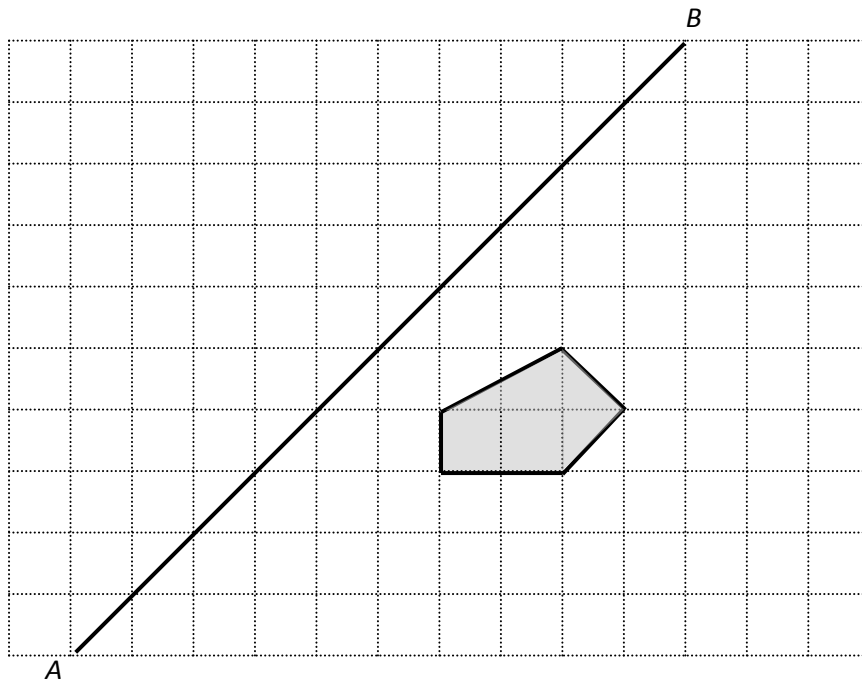
[2]
[Total 2 marks]

12. A stall sells apples and figs.

Apples cost *a* pence each.
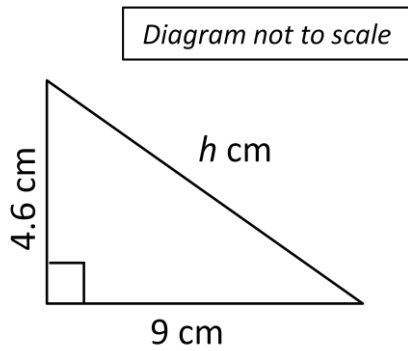Figs cost *f* pence each.

Sanjay buys 5 apples and 2 figs.
The total cost is *C* pence.

Write down a formula for *C* in terms of *a* and *f*.

....

[3]
[Total 3 marks]

13. Find the value of *h* in the triangle below. Give your answer to 3 significant figures.

Diagram not to scale

h cm

4.6 cm

9 cm

....
[4]

[Total 4 marks]

14. The ratio of burglaries to drugs offences recorded by police in a particular year was 17:3.

(a) If the number of burglaries was 153,000, how many drug offences were recorded?
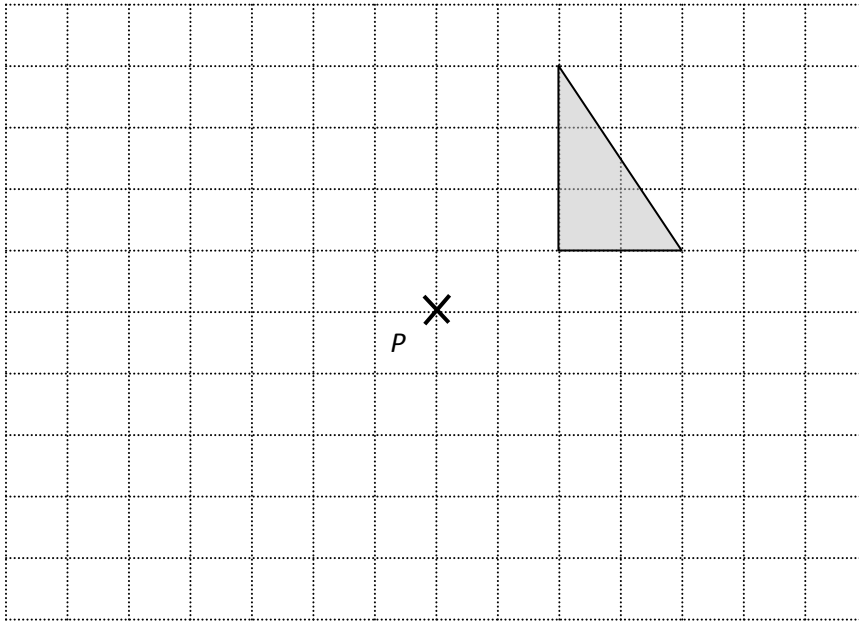
....
[2]

(b) If the **total** number of burglaries and drugs offences was 1 000 000, how many burglaries were there?

....
[2]

[Total 4 marks]

15.

On the grid, rotate the shaded triangle through 90°, anticlockwise, about the point *P*.

[2]

[Total 2 marks]

16.   Simplify the following by writing each as a single fraction.

(a) $\dfrac{9x}{4} \times \dfrac{2x}{6}$

....

[2]

(b) $\dfrac{a+1}{3} - \dfrac{1}{5}$

....

[3]

[Total 5 marks]

17.

ABC is an isosceles triangle with *AB = AC*.

BC = (2*x* − 1) centimetres.

AC = (*x* + 7) centimetres.

The perimeter of the triangle is 27 centimetres.

Work out the **length of *BC***.

.............................cm

[Total 5 marks]

18.
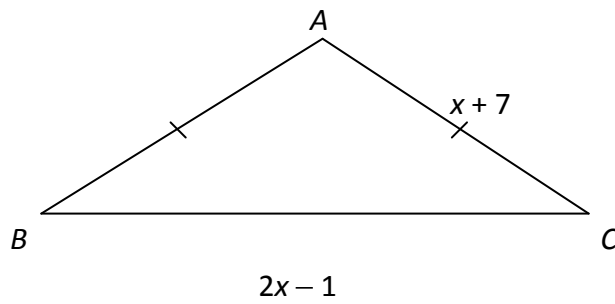
Diagram **NOT** accurately drawn
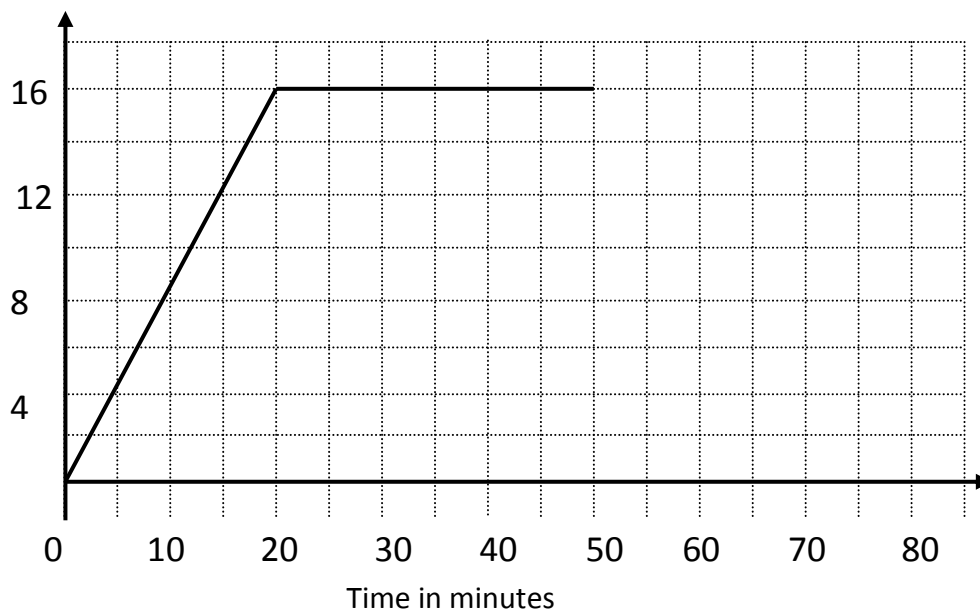
The exterior angle of a **regular** polygon is 40°.

Work out the number of sides of this regular polygon.

....

[3]

[Total 3 marks]

19.   Here is part of a travel graph of Jacob's journey from his house to the library.

Distance
in km from
Jacob's house

Time in minutes

(a)   How far is Jacob's house from the library?

.................................km

[1]

(b)   Work out Jacob's speed for the first 20 minutes of his journey. Give your answer in km/h.

...............................km/h

[3]

Jacob spends 30 minutes at the library.
He then travels back to his house at a steady speed of 64 km/h.

(c)   Complete the travel graph.

[2]
[Total 6 marks]

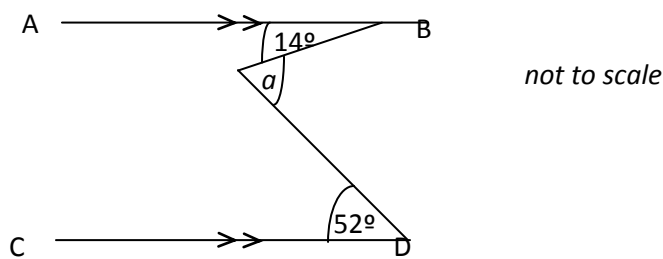20. Here are the first 5 terms of a number sequence.

   −2   3   8   13   18

(a) Work out the 10th term of the number sequence.

....
[2]

(b) Write down an expression, in terms of n, for the nth term of the number sequence

....
[2]
[Total 4 marks]

21. Line AB and line CD are parallel.

not to scale

Calculate the value of a, showing your working and/or reasoning clearly.

....
[4]
[Total 4 marks]

END OF EXAM – BE SURE TO CHECK YOUR WORK THOROUGHLY