

Name: ..... School: .....



# TONBRIDGE SCHOOL

Year 9 Entrance Examinations 2013

**MATHEMATICS (Higher)**

Saturday 9 November 2013

Time allowed: 1 hour

Total Marks: 100

**THIS IS A NON-CALCULATOR PAPER**

***Instructions:***

1. Complete "Name" & "School" section at the top of cover page
2. **All questions** should be attempted and **answers given in the space provided**
3. A completely correct answer may receive no marks unless all workings are shown

1. (a) Write £2.10 as a fraction of £6.00 in lowest terms.

Answer: ..... (2)

(b) Write  $\frac{7}{16}$  as a decimal.

Answer: ..... (2)

(c) Calculate 11% of \$19.00.

Answer: \$..... (2)

2. (a) By **first** writing each number correct to 1 significant figure, estimate the answer to

$$\frac{3.4 \times 156}{21.3}$$

Answer: ..... (3)

- (b) Calculate  $2^3 \times \sqrt{361}$

Answer: ..... (2)

- (c) (i) Write 84 as a product of prime factors, **using indices in your answer.**

Answer: ..... (2)

- (ii) Given that  $315 = 3^2 \times 5 \times 7$  what is the largest number which divides exactly into both 84 and 315?

Answer: ..... (1)

3. (a) Calculate the following, **giving answers as fractions in simplest form**:

(i)  $\left(1\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2$

Answer: ..... (2)

(ii)  $\frac{8}{11} \div \frac{2}{3}$

Answer: ..... (2)

4. (a) 180 centimetres of chord are needed to make a skipping rope.

How many metres of chord are needed to make 25 of these skipping ropes?

Answer: ..... (2)

(b) A total of 3 kilograms of jam is needed to fill 8 identical pots.

How many grams of jam does each pot contain?

Answer: ..... (2)

5. (a) It takes 1 hours 35 minutes to travel from London to Hastings by train. Tom catches the 8.45 a.m. train from London.

At what time should Tom arrive in Hastings ?

Answer: ..... (2)

- (b) How far does a bus travel in 55 minutes at 30km/h ?

Answer: ..... km (2)

6. Calculate

(i) the sum of 123.5 and 28.74

Answer: ..... (1)

(ii) the difference between 20.4 and  $-10.7$

Answer: ..... (1)

(iii)  $2.4 \times 0.4$

Answer: ..... (2)

(iv)  $240 \div 0.4$

Answer: ..... (2)

7. (a) **Fully simplify the following:**

(i)  $2a^3b + \frac{5a^4b}{a}$

Answer: ..... (2)

(ii)  $6m^2y^3 \times 5ym^2$

Answer: ..... (2)

(iii)  $\frac{7x^6}{35x^3}$

Answer: ..... (2)

(b) **Multiply out the brackets and simplify fully:**

$$3(3a^2 - 4b) - 2(b - a^2)$$

Answer: ..... (3)

(c) **Factorise completely**

$$108n^3 + 12n^2$$

Answer: ..... (2)



8. (a) Solve the following:

(i)  $2a + 12 = 21 - a$

Answer:  $a = \dots\dots\dots$  (1)

(ii)  $\frac{1}{4}(b + 3) = 10$

Answer:  $b = \dots\dots\dots$  (1)

(iii)  $\frac{1}{2}(7y + 1) - 3 = 8$

Answer:  $y = \dots\dots\dots$  (2)

(b) (i) Solve the inequality:

$$3(d + 5) \geq 11 - 2d$$

Answer:  $\dots\dots\dots$  (2)

(ii) What is the *smallest* integer which satisfies the inequality in part (b)(i) above ?

Answer:  $\dots\dots\dots$  (1)

9. (a) Given that  $x = -4$   $y = 2$   $z = -1$  find the value of

(i)  $2xy - 5z$

Answer: ..... (1)

(ii)  $(x - z^2)^3$

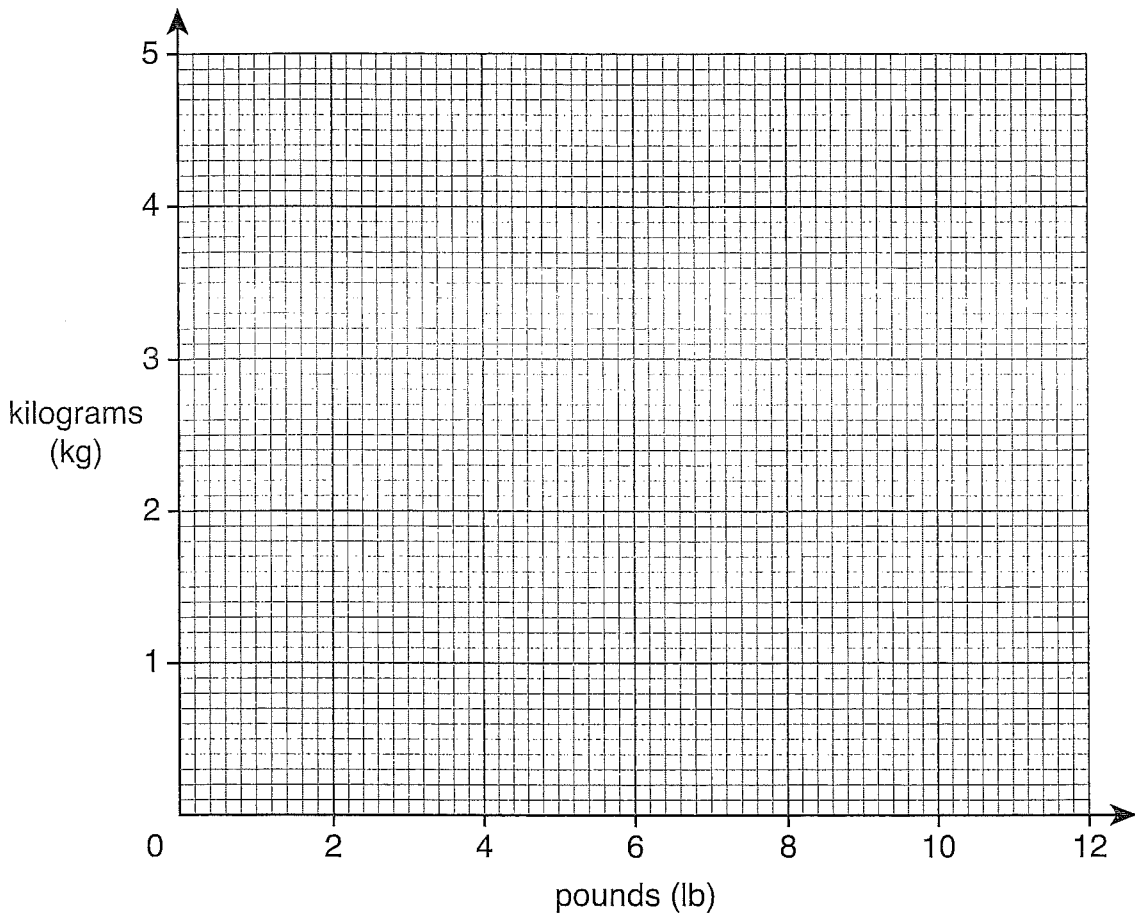
Answer: ..... (1)

(iii)  $\frac{y^4z}{x}$

Answer: ..... (1)

10. Olly has a set of Victorian kitchen scales.

They are marked in pounds (lb) but Olly's cookbook uses only kilograms (kg).



To solve the problem, Olly draws a graph to convert pounds to kilograms.

Olly knows that **11 pounds = 5 kilograms**

(i) On the grid above draw a line to convert masses up to 11 pounds into kilograms. (2)

Use the graph to answer the following questions, **showing clearly where you take your readings**.

(ii) Olly needs  $3\frac{1}{2}$  lb of stewing steak.

What is this mass in kg?

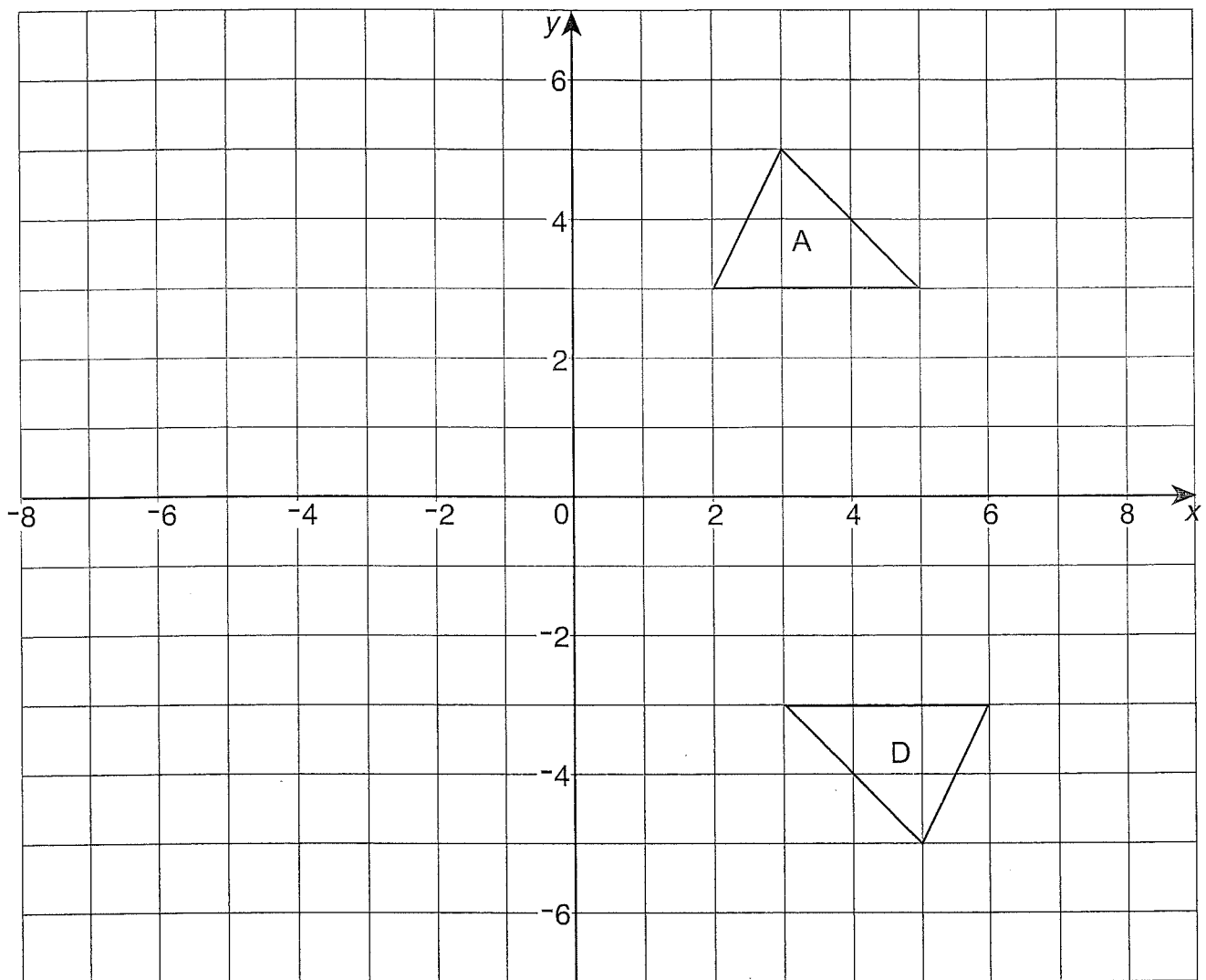
Answer: ..... kg (2)

(iii) Roasting a turkey takes 20 minutes per lb and then an extra 20 minutes.

What is the roasting time for a turkey with mass 4.6 kg?

Answer: ..... min (2)

11.



(a) Answer the following parts on the grid above.

(i) Draw and label the line  $x = -1$  (1)

(ii) Reflect triangle A in the line  $x = -1$   
Label the image B. (1)

(iii) Enlarge triangle A by scale factor 2 with centre (3, 5).  
Label the image C. (2)

(b) Describe in detail the single transformation which maps triangle A on to triangle D.

Answer: .....

..... (2)

12.  $a$  and  $b$  are two positive numbers.  
 $a$  is  $2\frac{1}{2}$  times as large as  $b$ .

(i) Write down an equation in terms of  $a$  and  $b$  to show this.

Answer: ..... (1)

2 times  $a$  is 16 more than  $b$ .

(ii) Write down an equation in terms of  $a$  and  $b$  to show this.

Answer: ..... (1)

(iii) Using your answers to parts (i) and (ii), solve equations to find the value of  $a$  and  $b$ .

Answer:  $a =$  .....

Answer:  $b =$  ..... (4)

13 (a) Here is a number grid:

25	30	35	40
30	36	42	48
35	42	49	56
40	48	56	64

Pat chooses a number from the grid at random.

What is the probability that it is

(i) the number **48**?

Answer: ..... (1)

(ii) an even number?

Answer: ..... (1)

(iii) a prime number?

Answer: ..... (1)

(b) When Anu tosses an ordinary 10p coin, it lands *heads* up.

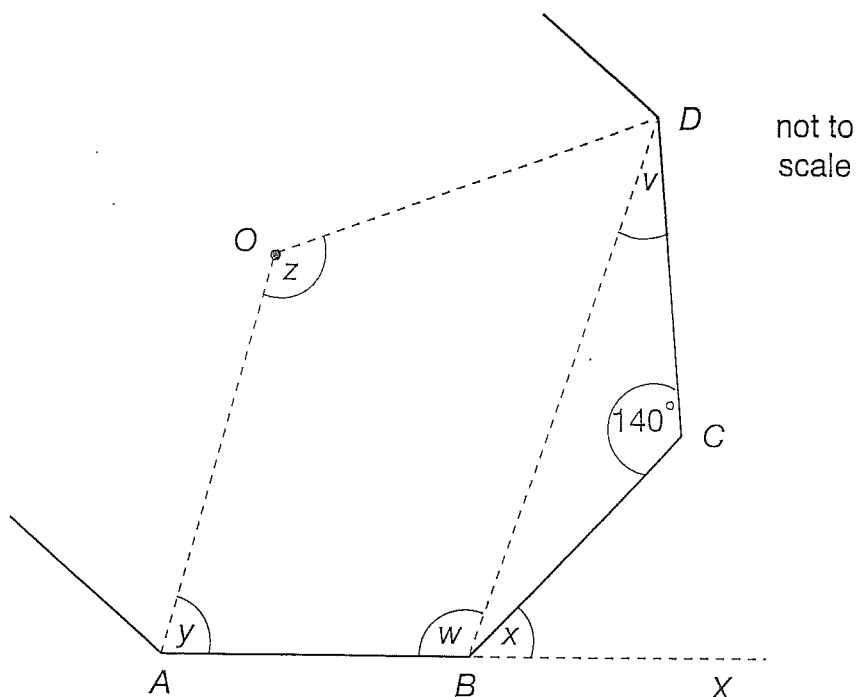
What is the probability that the same coin lands *tails* up the next time Anu tosses it?



Answer: ..... (1)

(c) The probability that Murphy will eat chips on any particular day is  $\frac{2}{5}$   
On how many days would you expect Murphy to eat chips this year?





$AB$ ,  $BC$  and  $CD$  are three sides of a regular polygon with centre  $O$ .

$ABX$  is a straight line.

Angle  $BCD = 140^\circ$

(i) Calculate the size of each of the angles marked  $v$ ,  $w$ ,  $x$ ,  $y$  and  $z$ .

Answer:  $v =$  ..... (2)

Answer:  $w =$  ..... (2)

Answer:  $x =$  ..... (1)

Answer:  $y =$  ..... (1)

Answer:  $z =$  ..... (2)

(ii) What special name is given to the regular polygon of which  $ABCD$  is part?

Answer: ..... (1)

15. A certain chocolate bar is a cuboid with dimensions 8cm by 3cm by 2cm. It is covered in a rectangular foil wrapper with an area which is 5% bigger than the total surface area of the cuboid.

What area of foil (in  $\text{km}^2$ ) is used in the annual production of 70 million bars ?

Answer: ..... (7)



16. The formula for a quantity  $y$  in terms of another quantity  $x$  is given by

$$y = a + bx^2, \text{ where } a \text{ and } b \text{ are fixed numbers.}$$

It is known that  $y = 10$  when  $x = 0$ , and  $y = 22$  when  $x = 2$ .

- a) Find  $a$  and  $b$ .
- b) Find  $x$  when  $y = 16$ .

Answer: ..... (7)

**TOTAL MARKS = 100**

