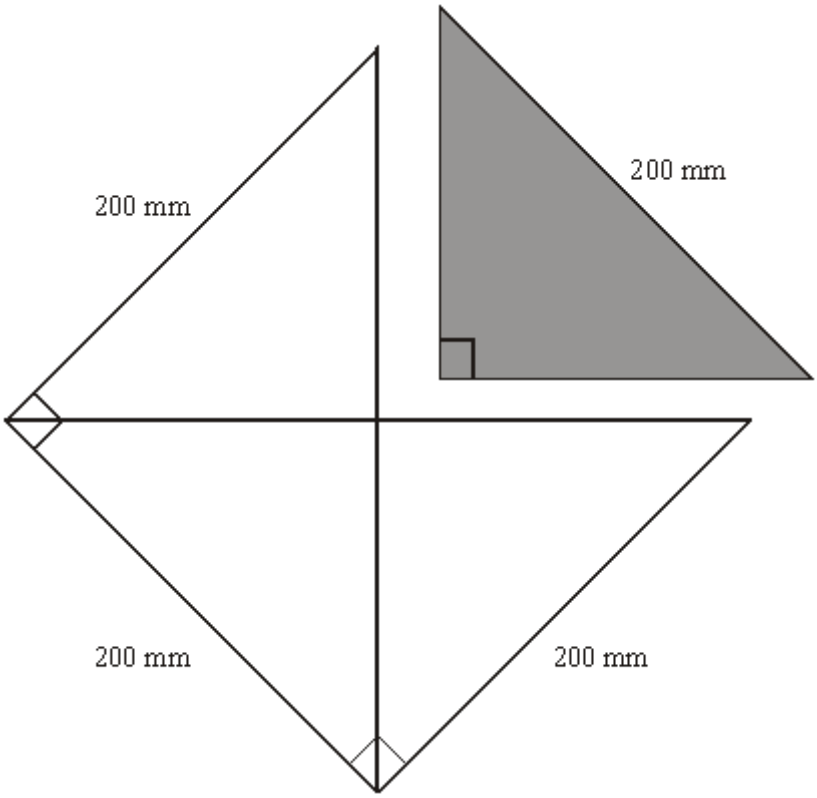
Q1. The shaded isosceles right angled triangle is cut out of a large square of side 200 mm.



The squares are cut out of an A0 sized rectangular piece of paper which has dimensions 1189 mm by 841 mm.

More triangles are cut from the paper that is left after the squares have been cut out.

What is the greatest total number of these triangles that can be cut out of the large, rectangular sheet of paper?

..... triangles

(Total 5 marks)

Q2.

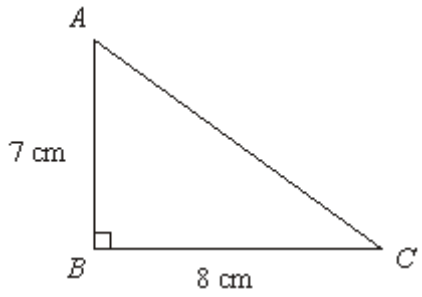


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 7 cm,
BC = 8 cm.

(a) Work out the area of the triangle.

..... cm^2

(2)

(b) Work out the length of AC.
Give your answer correct to 2 decimal places.

..... cm

(3)

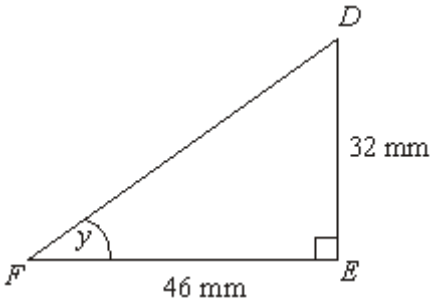


Diagram **NOT** accurately drawn

DEF is another right-angled triangle.
DE = 32 mm,
FE = 46 mm.

(c) Calculate the size of angle y
Give your answer correct to 1 decimal place.

..... °

(3)
(Total 8 marks)

Q3.

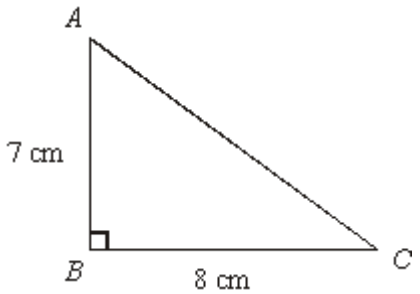


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 7 cm,
BC = 8 cm.

Work out the length of *AC*.
Give your answer correct to 2 decimal places.

..... cm

(Total 3 marks)

Q4.

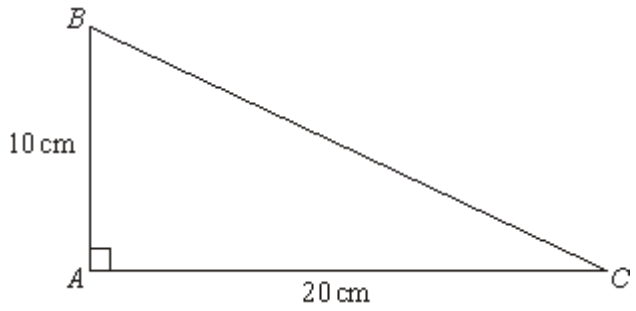


Diagram **NOT** accurately drawn

In triangle ABC,

AB = 10 cm
AC = 20 cm
angle BAC = 90°

Work out the length of BC.
Give your answer correct to 3 significant figures.
You must state the units in your answer.

....

(Total 4 marks)

Q5.

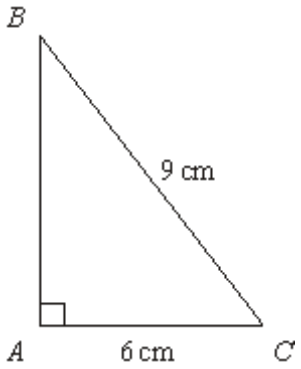


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.

AC = 6 cm.
BC = 9 cm.

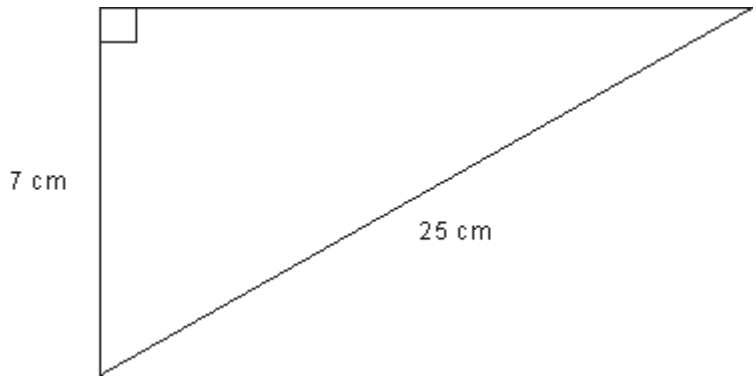
Work out the length of AB.
Give your answer correct to 3 significant figures.

..... cm

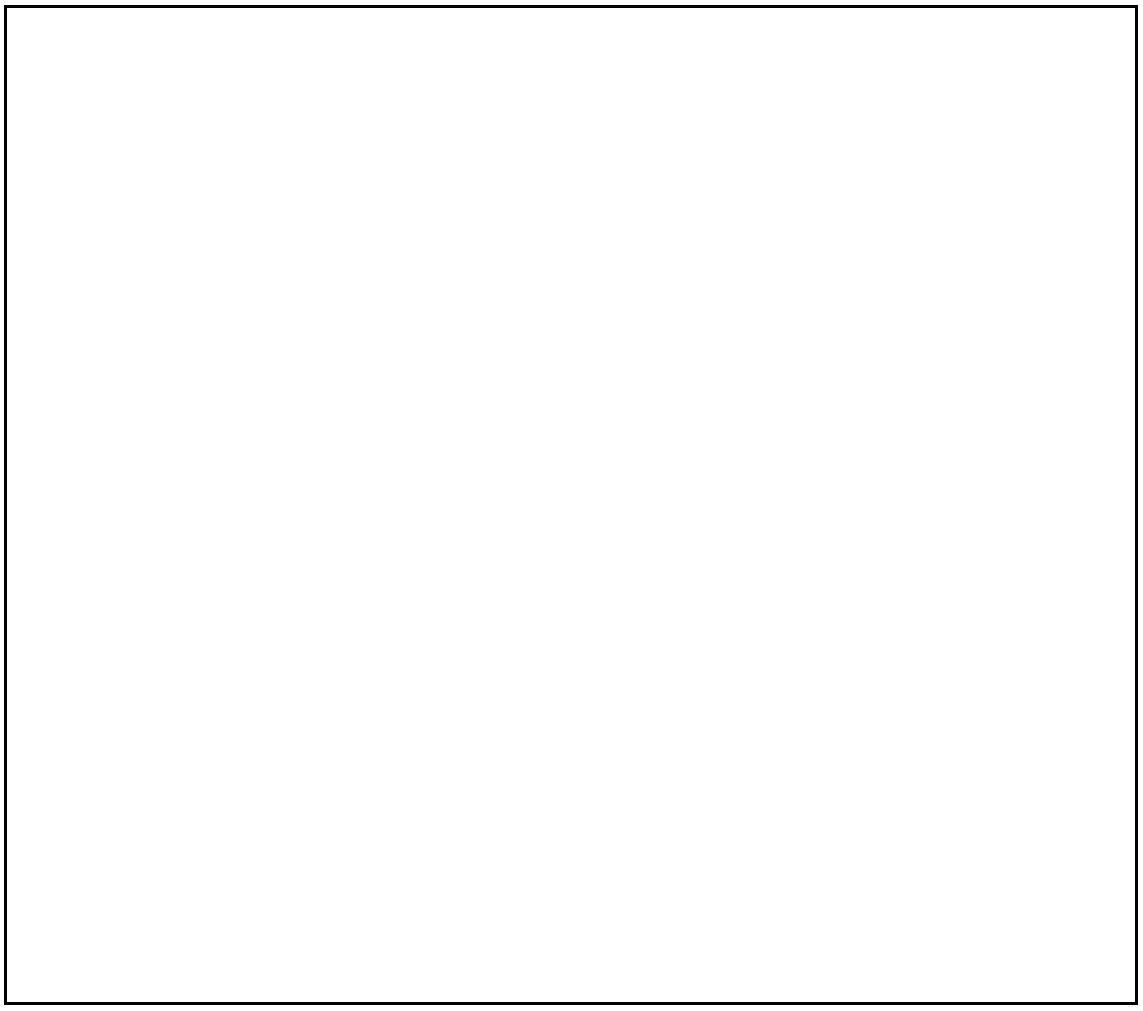
(Total 3 marks)

Q6.

Diagram **NOT** accuartely drawn



Calculate the area of this right-angled triangle.

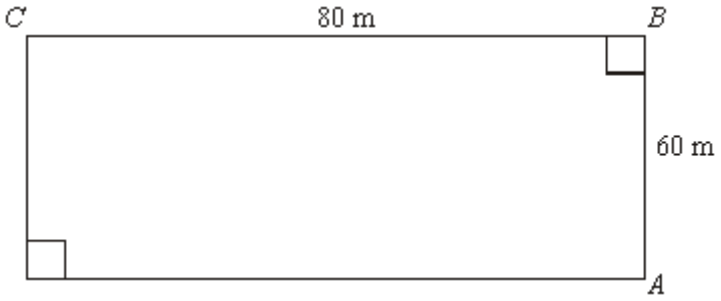


.....

(Total 4 marks)

Q7. Alan and Bhavana are planning their fitness program.
They plan to run on parts of a field.
The diagram below shows a rectangular field 80 metres by 60 metres.

Diagram **NOT**
accuartely drawn


C
80 m
B
60 m
A

Alan runs **around** the field from A to C (via B) at 5 m/s.

Bhavana runs directly across the diagonal of the field from A to C at 3 m/s.

If they both started at the same time, who would reach point C first?

You must explain your answer.

.....

.....

(Total 6 marks)

M1.

Working	Answer	Mark	Additional Guidance
1189 ÷ 200 or 891 ÷ 200 = 5 and 4 or 20 squares $200^2 \div 2$ $= \sqrt{(200^2 \div 2)}$ = 141.4 Realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 = 5 squares	90	5	**M1** for attempt to divide 1189 ÷ 200 or 891 ÷ 200 **M1** for $200^2 \div 2$ **M1** for $\sqrt{(200^2 \div 2)}$ **M1** for realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 **A1** cao for 90 triangles
			Total for Question: 5 marks

M2.

	Working	Answer	Mark	Additional Guidance
(a)	½ × 7 × 8 = ½ × 56 = 28	28	2	**M1** ½ × 7 × 8 or – × 7 × 8 × sin 90° **A1** cao
(b)	$8^2 + 7^2$ 64 + 49 = 113 $\sqrt{113}$ = 10.630145	10.63	3	**M1** $8^2 + 7^2$ or 64+49 or 113 or $8^2 + 7^2 – 2 \times 7 \times 8 \times \cos 90$ **M1** √"(64 + 49)" or √"113" where it is clear that the 8 and 7 have been squared **A1** Any answer in 10.63 – 10.631 inclusive SC **B1** 10.6 with no working with or without a scale drawing
(c)	$\tan y = 32/46 = 0.6956$ $\tan^{-1} 0.6956 = 34.82°$	34.8	3	**M1** $\tan (y =) \frac{32}{46}$

				M1 $\tan^{-1}$ 0.695(6) or $\tan^{-1}\left(\frac{32}{46}\right)$ or $\tan^{-1}\frac{32}{46}$ oe (e.g. 'shift tan' or 'inv tan' for $\tan^{-1}$) **A1** 34.79° – 34.85° **Or** **M1** for $\sqrt{(32^2 + 46^2)}$ (=56.03(5..)) and either $\frac{\sin 90}{56(0..)} = \frac{\sin y}{32}$ or $\frac{56.(0..)}{\sin 90} = \frac{32}{\sin y}$ **M1** $(y =) \sin^{-1}\left(\frac{32 \times \sin 90}{56.(0...)}\right) (= \sin^{-1}(0.571(06..)$ **A1** 34.79° – 34.85° SC1 **B2** Radians 0.607-0.608 **B2** Gradians 38.65 – 38.7 (both using tan) Alternative methods using Pythagoras and then sin or cos must have a fully correct method for Pythagoras and sin/cos before they score the first M1. The trigonometry could be SOHCAHTOA or Sine rule/Cosine rule
				Total for Question: 8 marks

M3.

Working	Answer	Mark	Additional Guidance
$8^2 + 7^2$ 64 + 49 = 113 $\sqrt{113}$ = 10.630145	10.63-10.631	3	**M1** $8^2 + 7^2$ or 64 + 49 or 113. **M1** √"(64 + 49)" or √"113"; where it is clear that the 8 and 7 have been squared. **A1** 10.63 – 10.631 inclusive. SC **B1** for 10.6 with no working, with or without a scale drawing.
			Total for Question: 3 marks

M4.

Working	Answer	Mark	Additional Guidance
$BC^2 = 20^2 + 10^2 = 500$	22.4cm	4	**M1** for (BC^2 =) $20^2 + 10^2$ or 400 + 100 or 500 or $20^2 + 10^2 - 2 \times 20 \times 10 \times \cos 90$ oe **M1** for $\sqrt{"400 + 100"}$ or $\sqrt{"500"}$ where it is clear that the 20 and 10 have been squared (could be implied by either 400 or 100 seen) **A1** for any answer in 22.36 – 22.4 inclusive **B1** (indep)cm
			Total for Question: 4 marks

M5.

Working	Answer	Mark	Additional Guidance
$9^2 - 6^2$ 81 – 36 = 45 $\sqrt{45}$	6.705 – 6.71	3	**M1** for $9^2 - 6^2$ or 81 – 36 or 45 or $9^2 = AB^2 + 6^2$ oe **M1** for $\sqrt{81-36}$ or $\sqrt{45}$ **A1** for 6.705 – 6.71 [**SC: M1** for $\sqrt{81+36}$ or $\sqrt{117}$]
			Total for Question: 3 marks

M6.

Working	Answer	Mark	Additional Guidance
$25^2 - 7^2 = 576$ $\sqrt{576} = 24$ $\frac{1}{2} \times 24 \times 7$	$84cm^2$	4	**M1** $25^2 - 7^2$ **M1** $\sqrt{25^2 - 7^2}$

	Total for Question: 4 marks

M7.

	Working	Answer	Mark	Additional Guidance
QWC ii	Alan 60 + 80 = 140 140 ÷ 5 = 28 Bhavana $60^2 + 80^2 = 10000$ $\sqrt{10000} = 100$ 100 ÷ 3=33.33333.... .	Alan, with statement supporting explanation	6	**B1** Alan runs 140 **M1** '140'÷ 5 **M1** $60^2 + 80^2$ **A1** 100 **A1** 28 or 33.33333... seen **C1** Alan stated with comparison of times and times attributed to correct person **QWC: Decision stated with statement supporting explanation**
				Total for Question: 6 marks

E2. Part (a) was answered correctly by the overwhelming proportion of the candidature. There were a few 56s to be seen and some candidates took advantage of the formula sheet to use $\frac{1}{2}ab\sin C$.

Part (b) was a standard Pythagoras question. Most candidates knew that they had to square and add. Some did not notice that the answer had to be given to correct to 2 decimal places, so 10.6 was not acceptable for full marks, unless a more accurate value were given in the working.

Part (c) caused more problems. A sizable proportion of candidates did not know where to start and tended to guess at an angle or to misuse the idea of tangent and write such things as $\tan = \frac{32}{46}$ or tan32 × 46. Some candidates evaluated the fraction $\frac{32}{46}$ as 0.7 and thus were not able to pick up the final accuracy mark for the size of the angle.
A minority of candidates took advantage of the formula page and used Pythagoras to calculate the hypotenuse and then use the sin rule to calculate the angle. This can get full marks, but candidates tend to lose out through a lack of accuracy.

E3. It was evident that few candidates understood Pythagoras, as attempts to square and add were rare. Common incorrect attempts included finding the area of the triangle, adding sides and then finding the square root, doubling rather than squaring, and again rounding of answers, this time incorrectly.

E4. Fully correct answers were seen from just over 40% of candidates. Just under a quarter of candidates were unable to make any progress. A few candidates subtracted the squares, a few tried trigonometric methods, or the cosine rule – usually unsuccessfully. The main errors were in missing out the units or giving units as cm squared or in the accuracy of the answer.

E5. Specification A

Many candidates realized the need to use Pythagoras' theorem and then applied it correctly. There were some though that took the required length to be the hypotenuse (finding root 117) and therefore lost marks. This question showed that some of the pupils did not have a clear understanding of what to do if the hypotenuse was given in a question. Some tried to treat it as a trigonometry question with some quite involved work. Many pupils did not round correctly (6.70 or 6.7); candidates should be reminded to give a full figure answer before rounding.

Specification B

A standard Pythagoras question involving squaring and subtracting, which many candidates could comfortably carry out. A few candidates squared and added.