Curriculum for Excellence - National 4 resources from Pegasys

CFE Mathematics

National 4

Added Value Unit

Practice Assessments 2014-15

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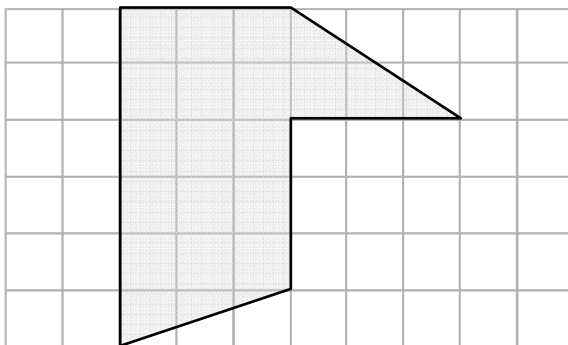**Pegasys Educational Publishing**

Part 1

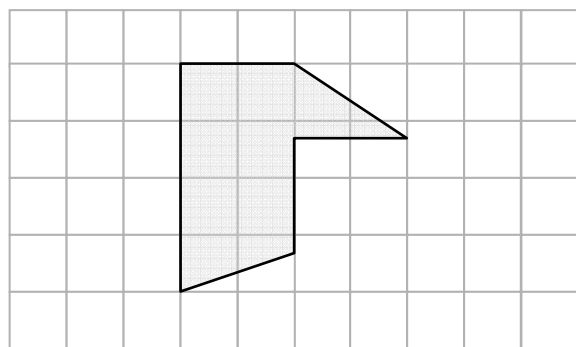**You may NOT use a calculator. Show appropriate working.**

Time allowed: 20 minutes.
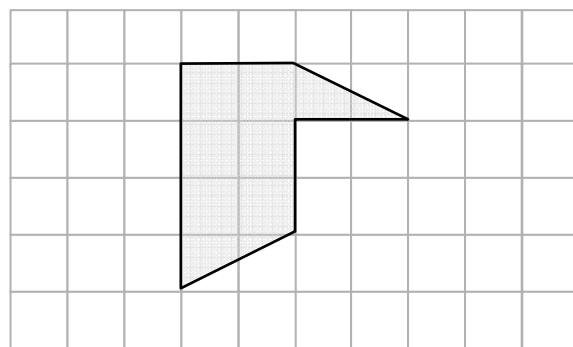
All questions should be attempted.

1.   Gordon and Sally were asked to make a drawing to reduce this shape by a scale factor of $\frac{2}{3}$.

Here are the drawings they made.

Gordon

Sally

Who carried out the task correctly? Explain your answer.   (**1 and #**)

2.   Two different stretches of the West Highland Way are 32·4km and 12·7 km.

Raymond has walked 39·2km. How much does he still have to walk?   (**3**)

3. 252 people entered a charity fun run. $\frac{6}{7}$ of them finished in less than one hour.
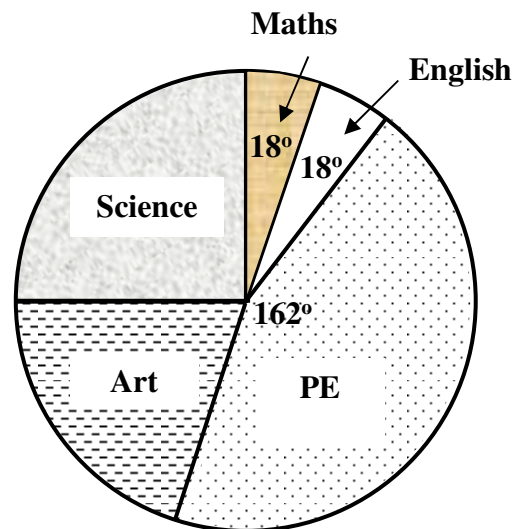
How many peopled was this? **(3)**

4. A group of 225 S4 pupils were asked to say what their favourite subject was.

The results are shown in the pie chart opposite.

How many pupils said Art was their favourite subject?

(# and 3)

5. 900 people attended a concert. 70% of them were under 25 years old.

How many people at the concert were under 25 years old? **(3)**

End of part 1 of the Test

Part 2

You may use a calculator. Show appropriate working.

Time allowed: 20 minutes.

All questions should be attempted.
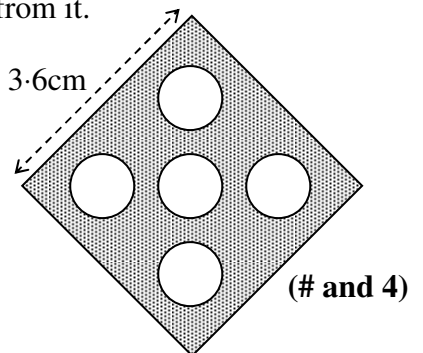
1.   Solve algebraically the equation $11x + 7 = 5x + 13$ **(3)**

2.   An earring is made from a square of copper with 5 circles cut out from it.
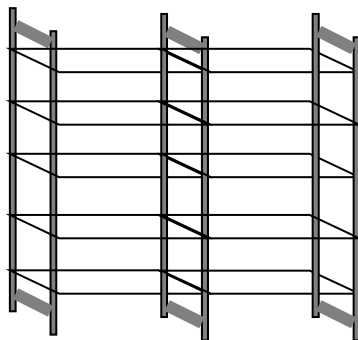
The square has side 3·6 cm and each circle has diameter 0·9 cm.   3·6cm

Calculate the area of copper in each earring.

(ie the shaded area in the diagram)   **(# and 4)**

3.   A shelving unit is made by joining side panels and shelves as shown below.

The shelves shown in the diagram have three side panels and ten shelves.

(a)   Copy and complete the following table.   **(1)**

Number of side panels (P)	2	3	4	5		20
Number of shelves (S)		10		20		

(b)   Write down a formula for the number of shelves, S, when you know the number of side panels , P.   **(2)**

(c)   If there are 50 shelves, how many side panels would be needed?   **(# and 1)**

4. Mr. Fit ran the Glasgow Marathon last year. It took him 3 hours and 45 minutes and he ran at an average speed of 7 m.p.h.

Calculate the length of the marathon giving your answer to the nearest mile. **(3)**

5. Anne has a tee shirt which has a rectangular motif on it. Strips of sequins run along the diagonals and round the perimeter of the rectangle.
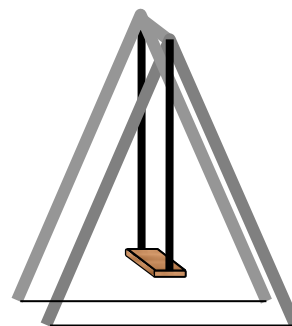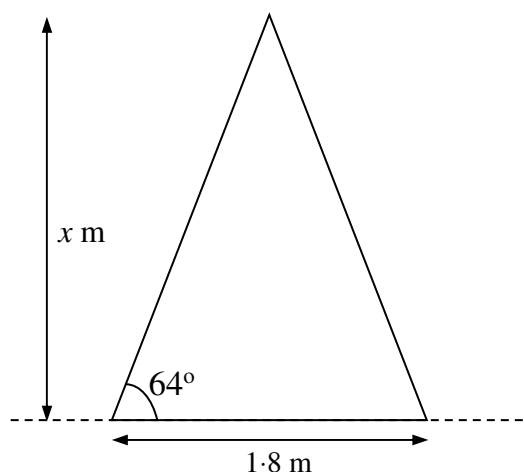

15cm

9cm
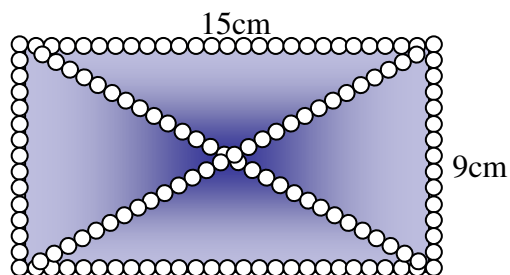
Calculate the total length of sequins required for this motif. **(# and 4)**

6. The frame of a child's swing is in the shape of an isosceles triangle.

The base of the triangle is 1·8 metres and makes an angle of 64º with the horizontal as shown in the diagram.

x m

64º

1·8 m

To be safe the height of the swing should be no more than 1·9 metres.
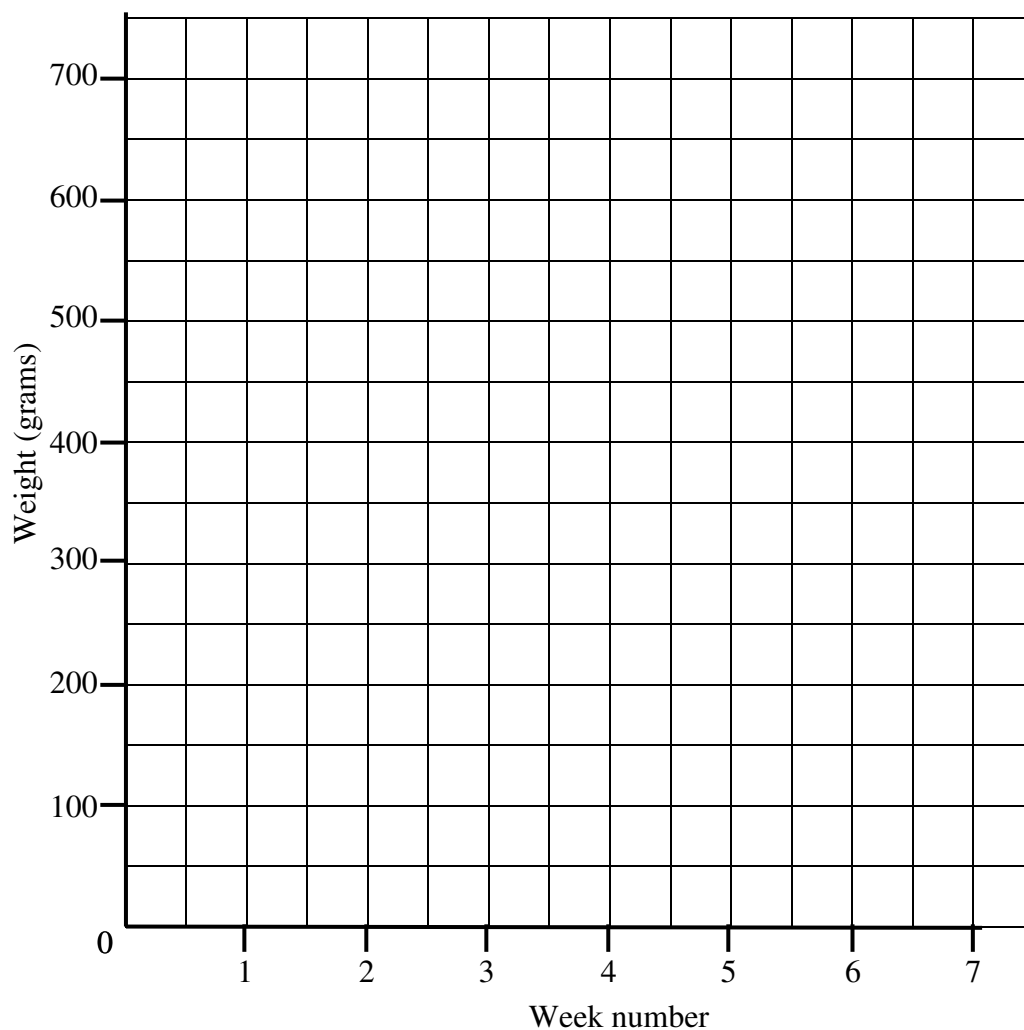
Is this swing safe? **(3 and #)**

7. David has a few tomato plants in his greenhouse. Each week he picks the tomatoes and records the weight of them.

The weights are shown here:
Week 1	100g	Week 5	500g
Week 2	250g	Week 6	450g
Week 3	300g	Week 7	575g

(a) On the grid below, draw a scattergraph to show this information. **(2)**

(b) Draw a line of best fit through the points on the graph. **(1)**

(c) David didn't weigh the tomatoes on week 4 but estimated that they would have weighed 440g. Do you agree with this? **(R)**

8. Sonia and Kate bought tickets for two different raffles.

Raffle one had a total of 300 tickets and Sonia bought 6 of them.

Kate had 8 tickets for the other raffle where there were a total of 360 tickets sold.

Kate thought she had a better chance of winning than Sonia.

Is she correct? Justify your answer. **(2 and R)**

End of part 2 of the Test

Part 1

Question	Points of Process or Accuracy	Expected responses
1	• checks lengths # Correct conclusion	• evidence # Gordon is correct with reason why other drawing is incorrect
For an yes/no answer without any acceptable explanation award 0/2		
2	• Evidence of appropriate addition and subtraction • Correct addition • Correct subtraction	• $32·4+ 12·7 - 39·2$ • $45·1$ • $4·9$ (km)
Correct answer only award 1/3 Unit must be given for the last mark to be awarded		
3	• Evidence of division by 7 and multiplication by 6 • Divide by 7 correctly • Multiply by 6 correctly	• $252 \div 7 \times 6$ • 36 • 216
Correct answer only award 1/3		
4	# Correct strategy • Process angle • Interpret fraction • Answer	# $360 - (18 + 18 + 90 + 162)$ • 72 • 72/360 or equivalent • 1/5 of 225 = 45
Correct answer only award 1/4		
5	• Evidence of appropriate division and multiplication • Correct division • Correct multiplication	• Divide by 10 and multiply by 7 or equivalent • 90 • 630
Correct answer only award 1/3		

Part 2

Question	Points of Process or Accuracy	Expected responses
1	• Correct gathering of x terms • Correct gathering of number terms • Correct solution	• $6x$ • $6x = 6$ • $x = 1$
Correct answer only award 1/3		
2	# Overall strategy • Finds area of square • Correct radius for circle • Finds area of circles • Shaded area found	# Evidence of composite area including finding radius of circle • $3·6 \times 3·6 = 12·96$ • $r = 0·45$cm • $3·17925$cm² [using 3·14] • $9·78$ cm² [accept any rounding]
Correct answer only award 1/4 (operational mark)		
3(a) **(b)** **(c)**	• Table completed • Evidence of multiplier • Correct formula # equate to 50 • Solve	• 5, 15, 95 • Evidence of × 5 • $S = 5P - 5$ # $5P - 5 = 50$ • Number of side panels = 11
4	• Correct time in hours • Correct use of formula • Correct calculation and rounding	• 3·75 hours • $7 \times 3·75$ • 26 miles
Correct answer only award 1/3		
5	# Correct strategy • Correct Pythagoras statement • Correct side • Length of 2 diagonals • Total length found	# finds diagonal using Pythagoras' theorem, multiplies then adds 2 lengths and 2 breadths • $15² + 9²$ • 17·5 [any rounding] • 35cm • $35 + 30 + 18 = 83$cm
Correct answer only award 1/4 (operational mark)		
6	• Know to use tangent ratio • State correct ratio • Calculate height # valid conclusion	• $\tan x^o$ • $\tan 64^o = x/0·9$ • 1·85 metres[any rounding] # swing safe since 1·85 < 1·9
Correct answer only award 0/3 and # 0/1		

7(a)	• 4 points plotted on grid • Further 2 points plotted on grid	• Points plotted correctly • Points plotted correctly
(b)	• Line of best fit drawn	• Acceptable line drawn
(c)	# correct conclusion	# conclusion must be valid for line of best fit drawn
8	• Probability for raffle one • Probability from raffle two # correct conclusion with reason	• P = 6/300 = 1/50 • P = 8/360 = 1/45 # Kate is correct since 1/45 > 1/50 [accept any valid explanation]
Correct answer only award 0/2 and #0/1		

Total process and accuracy points for this test: 39

Total reasoning points for this test: 8

Part 1

You may NOT use a calculator. Show appropriate working.

Time allowed: 20 minutes.

All questions should be attempted.

1.   7500 people attended a local football match. 40% of them were senior citizens.
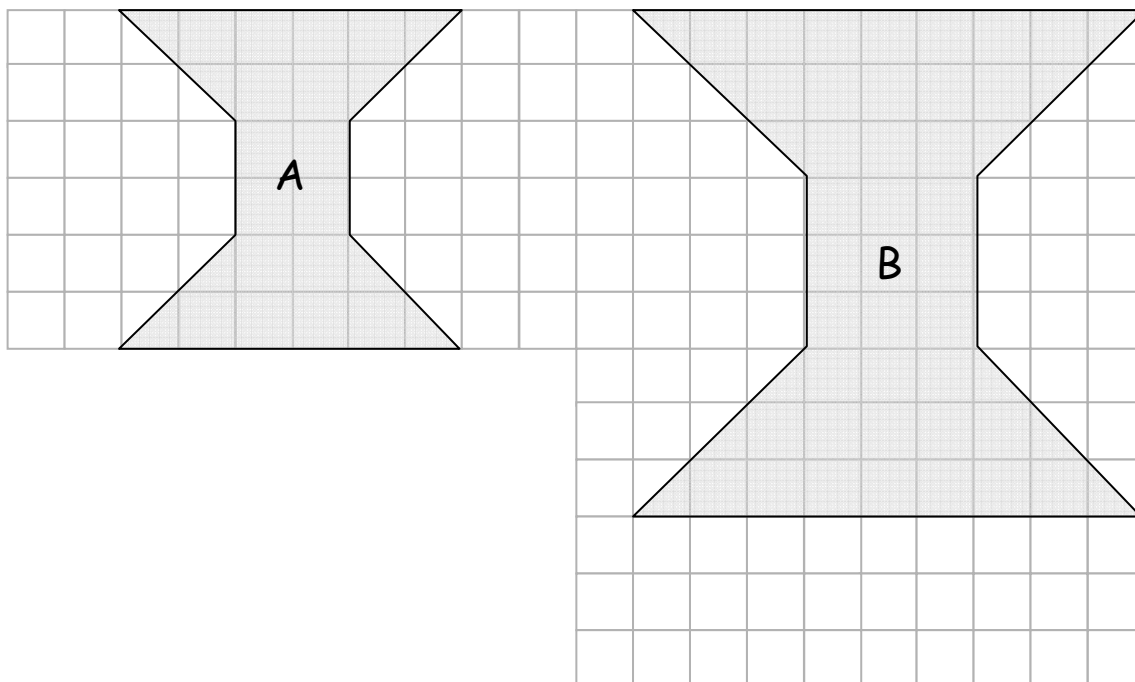
      How many senior citizens were there at the match?   **(3)**

2.   A poultry farmer has 15 272 turkeys. At Christmas he sold $\frac{7}{8}$ of them.

      How many turkeys did he sell?   **(3)**

3.   Shape A has been enlarged by a scale factor to give shape B.

      Cooper thinks that a scale factor of $\frac{3}{2}$ has been used.
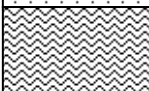
      Is he correct? Explain your answer.   **(1 and #)**

4. To water and feed some plants 14·5 litres of water were mixed with 1·32 litres of liquid feed.

There were 0·95 litres left after the plants had been watered.

How much of the mixture was used for the plants? **(3)**

5. Some workers in a call centre attended a Health screening. The pie chart

illustrates the information obtained about their smoking habits.
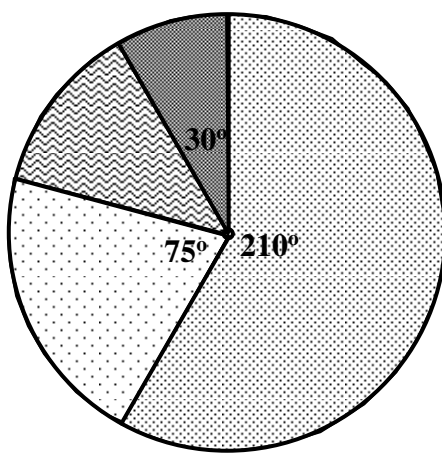
	Non-smokers
	Smokers
	Smokers who want to give up
	Ex-smokers

If 248 workers attended the health day, how many of them were smokers who

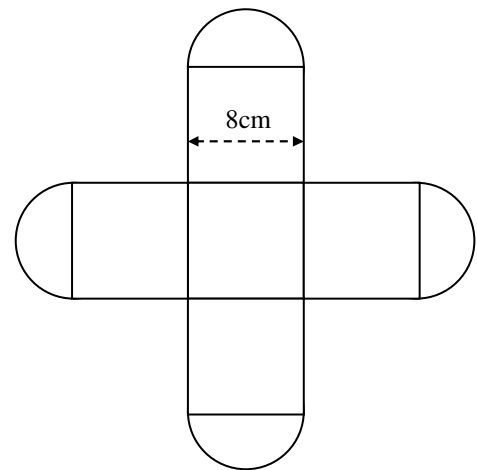wanted to give up? **(# and 3)**

End of part 1 of the Test

Part 2

You may use a calculator. Show appropriate working.

You have approximately 40 minutes to complete Part 2.

1.   Solve algebraically the equation $5x - 6 = 22 - 2x$ **(3)**

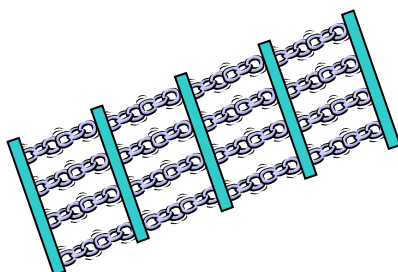**2.**   This gift box has a net as shown in the diagram.

The net consists of 5 identical squares and 4 identical semi - circles.

The squares have side 8cm.

Calculate how much card would be needed to make one box. [Ignore overlaps]   **(# and 4)**

3. A bar gate bracelet is designed with 4 chain links between 2 solid bars as show in the diagram below.

(a) Complete the table below. **(1)**

Number of bars (b)	2	3	4	5	6		10
Number of chains (c)	4	8	12				

(b) Find a formula for calculating the number of chain links (c) when you know the number of bars (b). **(2)**

(c) How many bars would be in a bracelet which had 64 gold chain links? **(# and 1)**

4. Alisha is a sales rep and travelled from Inverness to Stranraer last week. She left Inverness at 0825 and arrived in Stranraer at 1340.
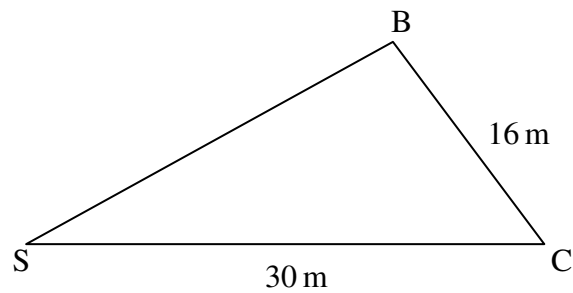
If she travelled at an average speed of 50 m.p.h., how far is it from Inverness to Stranraer? **(4)**

5.   Two boys, Shakeel and Chris are playing football.

At one point Chris (C) is 30 m due east of Shakeel (S). The ball is at position B.
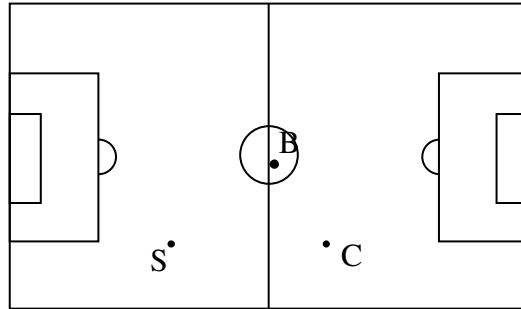
The positions of the 2 boys in relation to the ball are shown in the diagram.

Chris is 16 m away from the ball and angle SBC = 90°.

Calculate how far Shakeel is away from the ball.

Give your answer correct to 1 decimal place.   **(# and 3)**

6. A skate board launching ramp has a side view as shown below. It is made up of a rectangle and a right angled triangle with longest side 1·5m.

0·6 m

1·5 m

x^o

To meet regulations the angle marked 'x^o' in the diagram should be no more than 25°.
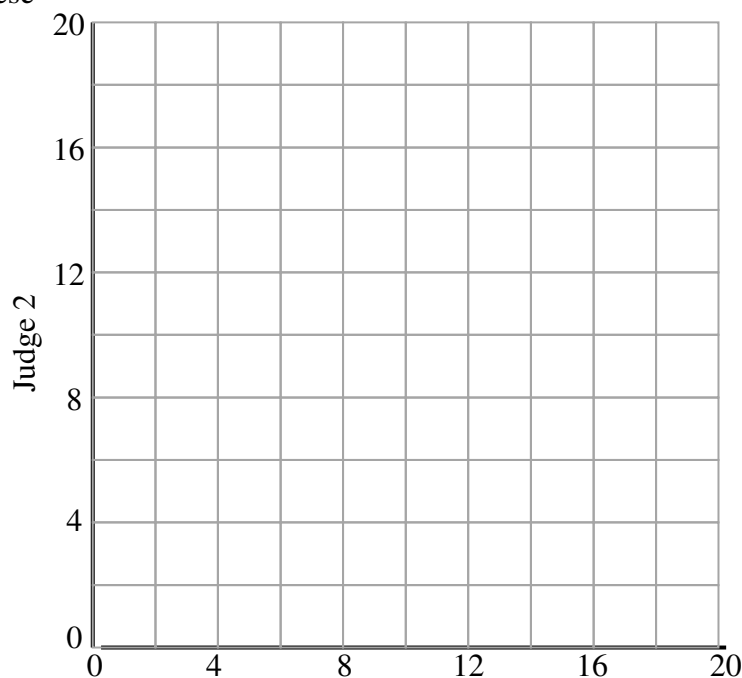
Does the skate board launching ramp above meet regulations? **(3 and #)**

7. In a dance competition there were 2 judges. Here are the scores (out of 20) that they gave some competitors.

Judge 1	Judge 2
4	6
6	11
8	14
12	12
15	16
18	19

(a) Draw a scattergraph of these scores on the grid below. **(2)**

(b) Draw a best fitting line for this scattergraph. **(1)**

(c) Daryl got a score of 10 from Judge 1 and thought that Judge 2 would be likely to give him a score of 15.

Do you agree with Daryl? **(#)**

8. In one class 18 pupils out of total of 24 liked Maths.

In a second class 21 out of 30 pupils liked Maths.

Tristan thinks that if a pupil was chosen at random from the first class that there was a better chance that they would like Maths than if the pupil was chosen from the second class?

Is he correct? Explain your answer. **(2 and #)**

End of part 2 of the Test

The tables below show the main points which demonstrate the achievement of the Assessment Standard.

Points of process and accuracy for the operational skills are marked with bullet points in the table.

Points of reasoning are marked # in the table.

Part 1

Question	Points of Process or Accuracy	Expected responses
1	• Evidence of appropriate division and multiplication • Correct division • Correct multiplication	• Divide by 10 and multiply by 4 or equivalent • 750 • 4000
Correct answer only award 1/3		
2	• Evidence of division by 8 and multiplication by 7 • Divide by 8 correctly • Multiply by 7 correctly	• $15272 \div 8 \times 7$ • 1909 • 13363
Correct answer only award 1/3		
3	• checks lengths # Correct conclusion	• evidence # Cooper is correct as each line in Shape B is 3/2 times longer than in shape A.
• For a yes/no answer without explanation award 0/2		
4	• Evidence of appropriate addition and subtraction • Correct addition • Correct subtraction	• $14 \cdot 5 + 1 \cdot 32 - 0 \cdot 95$ • $15 \cdot 82$ • $14 \cdot 87$(litres)
Correct answer only award 1/3 Unit must be given for the last mark to be awarded		
5	# Correct strategy • Process angle • Interpret fraction • Answer	# $360 - (30 + 75 + 210)$ • 45 • 45/360 or equivalent • 1/8 of 248 = 31
Correct answer only award ¼		

Part 2

Question	Points of Process or Accuracy	Expected responses
1	• Correct gathering of x terms • Correct gathering of number terms • Correct solution	• $7x$ • $7x = 28$ • $x = 4$
Correct answer only award 1/3		
2	# Overall strategy • Finds area of squares • Correct radius for circle • Finds area of two circles • Total area found	# Evidence of composite area including finding radius of SC • $8 \times 8 \times 5 = 320$ • $r = 4$ • $3 \cdot 14 \times 4^2 \times 2 = 100 \cdot 48$ • $420 \cdot 48$ cm² [accept any rounding]
Correct answer only award 1/4 (operational mark)		
3(a)	• Table completed	• 16, 20, 36
(b)	• Evidence of multiplier • Correct formula	• Evidence of $\times 4$ • $c = 4b - 4$
(c)	# equate to 64 • Solve	# $64 = 4b - 4$ • 17
4	• Correct time interval • Correct time conversion • Uses correct formula • Answer	• 5 hours 15 minutes • $5 \cdot 25$hrs • $50 \times 5 \cdot 25$ • $262 \cdot 5$ miles
Correct answer only award 0/4		
5	# Right – angled strategy • Correct Pythagoras statement • Correct length • Correct rounding	# know to use Pythagoras' theorem • $30^2 - 16^2$ • $25 \cdot 3771\ldots$ • $23 \cdot 4$ m
Correct answer only award 1/3 (operational mark)		
6	• Know to use sine ratio	• $\sin x^{\circ}$

	• State correct ratio • Calculate angle # valid conclusion with reason	• sin x^o = 0·6/1·5 • 23·6° [accept any rounding] # Meets regs since 23·6 < 25	
Correct answer only award 0/3 and # 0/1			
7(a)	• 4 points plotted on grid • Further 2 points plotted on grid	• Points plotted correctly • Points plotted correctly	
(b)	• Line of best fit drawn	• Acceptable line drawn	
(c)	# correct conclusion	# conclusion must be valid for line of best fit drawn	
8	• Probability for first class • Probability from bag 2 # correct conclusion with reason	• P = 18/24 = 3/4 (0·75) • P = 21/30 = 7/10 (0·7) # Tristan is not correct since 0·75 > 0·7 [accept any valid explanation]	
Correct answer only award 0/2 and #0/1			

Total process and accuracy points for this test: 40

Total reasoning points for this test: 8