

# Sequences (Credit Past Paper quest 2003 – 2007)

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(C) 8. A number pattern is given below.

(P1)

1<sup>st</sup> term:  $2^2 - 0^2$

2<sup>nd</sup> term:  $3^2 - 1^2$

3<sup>rd</sup> term:  $4^2 - 2^2$

(a) Write down a similar expression for the 4<sup>th</sup> term.

(b) Hence or otherwise find the  $n^{\text{th}}$  term in its simplest form.

RE

1

3

(D) 14. The sum  $S_n$  of the first  $n$  terms of a sequence, is given by the formula

(P1)

$$S_n = 3^n - 1.$$

(a) Find the sum of the first 2 terms.

(b) When  $S_n = 80$ , calculate the value of  $n$ .

RE

1

2

# Sequences (Credit Past Paper quest 2003 – 2007)

- (A) 11. Using the sequence  
(PI)

1, 3, 5, 7, 9, . . . .

- (a) Find  $S_3$ , the sum of the first 3 numbers.  
 (b) Find  $S_n$ , the sum of the first  $n$  numbers.  
 (c) Hence or otherwise, find the  $(n + 1)^{\text{th}}$  term of the sequence.

RE
1
2
2

- (B) 12. (PI)

7, -2, 5, 3, 8

In the sequence above, each term after the first two terms is the sum of the previous two terms.

For example: 3rd term = 5 = 7 + (-2)

- (a) A sequence follows the above rule.  
 The first term is  $x$  and the second term is  $y$ .  
 The fifth term is 5.  
 $x, y, -, -, 5$   
 Show that  $2x + 3y = 5$

- (b) Using the same  $x$  and  $y$ , another sequence follows the above rule.  
 The first term is  $y$  and the second term is  $x$ .  
 The sixth term is 17.  
 $y, x, -, -, -, 17$ .  
 Write down another equation in  $x$  and  $y$ .

- (c) Find the values of  $x$  and  $y$ .

KU	RE
	2
	2
	3

# Surds / Indices (Credit Past Paper ques 2003 – 2007)

(A) 12. (a) Evaluate  
(P1)

$$8^{\frac{2}{3}}$$

(b) Simplify

$$\frac{\sqrt{24}}{\sqrt{2}}$$

KU  
2

2

(B) 11. (a) Simplify  
(P1) (b) Evaluate

$$2\sqrt{75}$$

$$2^0 + 3^{-1}$$

KU  
2

2

(C) 11.  
(P1)

$$f(x) = 4\sqrt{x} + \sqrt{2}$$

(a) Find the value of  $f(72)$  as a surd in its simplest form.

(b) Find the value of  $t$ , given that  $f(t) = 3\sqrt{2}$ .

KU  
3

RE  
3

(D) 4. (b) Expand  
(P2)

$$m^{\frac{1}{2}}(2 + m^2)$$

(c) Simplify, leaving your answer as a surd

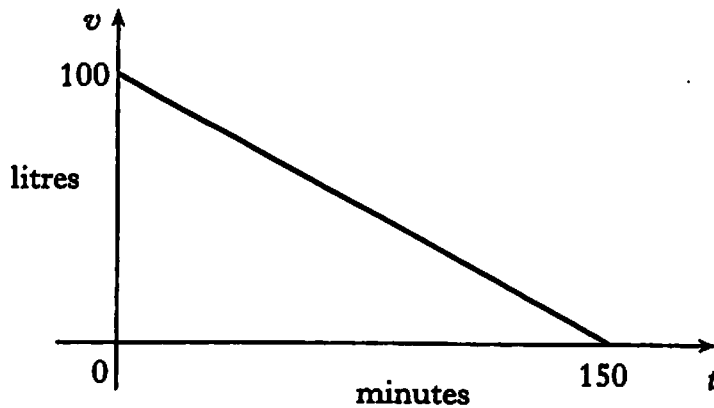
$$2\sqrt{20} - 3\sqrt{5}$$

KU  
2

2

# Straight Line (Credit Past Paper quest 2003 – 2007)

2. (C) A tank which holds 100 litres of water has a leak.  
(P2) After 150 minutes, there is no water left in the tank.



The above graph represents the volume of water ( $v$  litres) against time ( $t$  minutes).

- (a) Find the equation of the line in terms of  $v$  and  $t$ .  
(b) How many minutes does it take for the container to lose 30 litres of water?

KU  
3

RE  
3

5. (D) In an experiment involving two variables, the following values for  $x$  and  $y$  were recorded.  
(P1)

$x$	0	1	2	3	4
$y$	6	4	2	0	-2

The results were plotted, and a straight line was drawn through the points.  
Find the gradient of the line and write down its equation.

KU  
3

# Area / Vol / Length

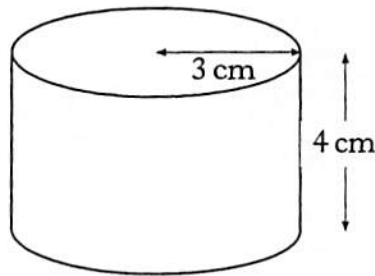
(Credit Past Paper quest 2003 – 2007)

KU RE

2. (a) A cylindrical paperweight of radius 3 centimetres and height 4 centimetres is filled with sand.

(P2)

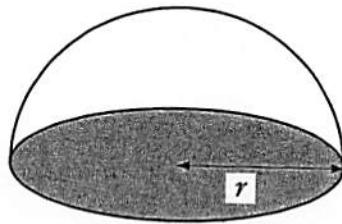
H



Calculate the volume of sand in the paperweight.

2

- (b) Another paperweight, in the shape of a hemisphere, is filled with sand.



It contains the same volume of sand as the first paperweight.

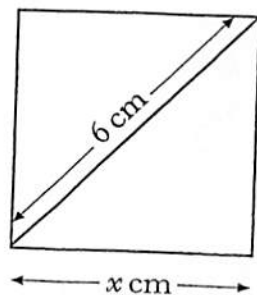
Calculate the radius of the hemisphere.

[The volume of a hemisphere with radius  $r$  is given by the formula,  
 $V = \frac{2}{3}\pi r^3$ .]

3

9. (a) A square of side  $x$  centimetres has a diagonal 6 centimetres long.

(P1)



Calculate the value of  $x$ , giving your answer as a surd in its simplest form.

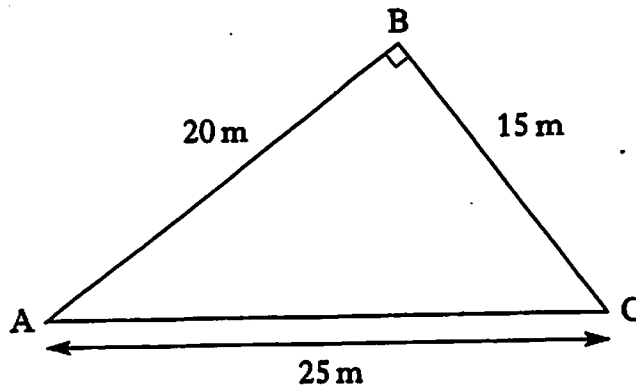
RE  
3

# Area / Vol / Length

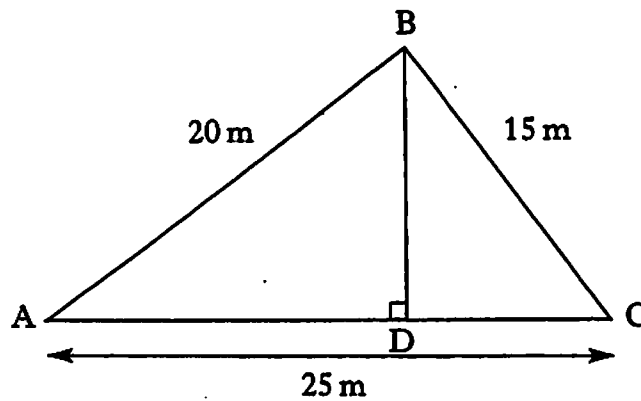
- (F) 10. Triangle ABC is right-angled at B.  
(P1) The dimensions are as shown.

(Credit Past Paper quest

2003 – 2007)

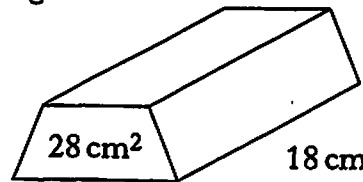


- (a) Calculate the area of triangle ABC.  
(b) BD, the height of triangle ABC, is drawn as shown.



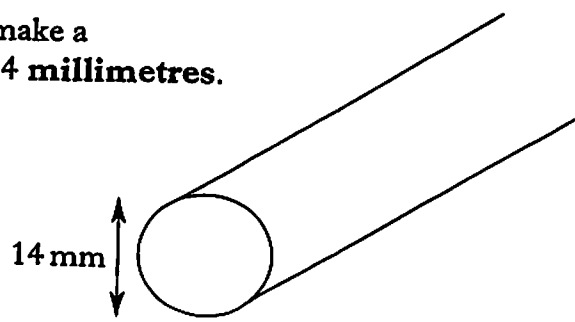
Use your answer to part (a) to calculate the height BD.

- (G) 7. (a) A block of copper 18 centimetres long  
(P2) is prism shaped as shown.



The area of its cross section is 28 square centimetres.  
Find the volume of the block.

- (b) The block is melted down to make a cylindrical cable of diameter 14 millimetres.



Calculate the length of the cable.

KU  
1

RE  
3

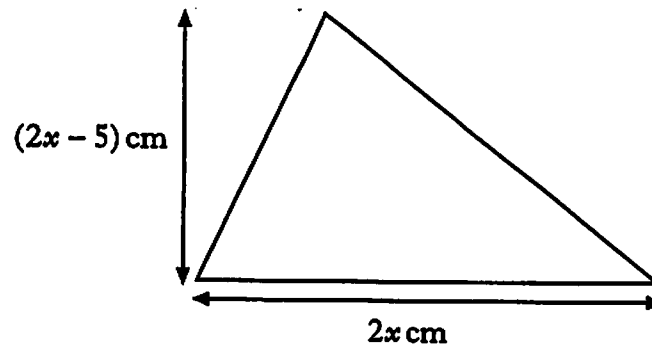
KU  
1

RE

# Area / Vol / Length

(Credit Past Paper quest 2003 – 2007)

12. The height of a triangle is  $(2x - 5)$  centimetres and the base is  $2x$  centimetres.  
(P1)

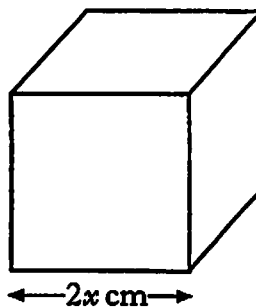


The area of the triangle is 7 square centimetres.  
Calculate the value of  $x$ .

RE  
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8. (P2) (E)

The side length of a cube is  $2x$  centimetres.



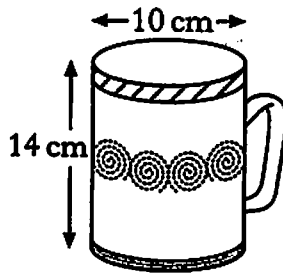
The expression for the volume in cubic centimetres is equal to the expression for the surface area in square centimetres.

Calculate the side length of the cube.

# Area / Vol / Length

(Credit Past Paper quest 2003 – 2007)

- (B) 4. A mug is in the shape of a cylinder with diameter 10 centimetres and height 14 centimetres.  
(P2)

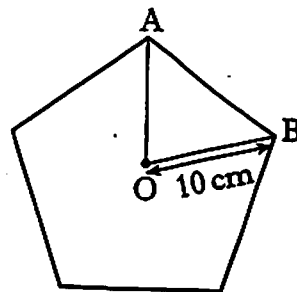
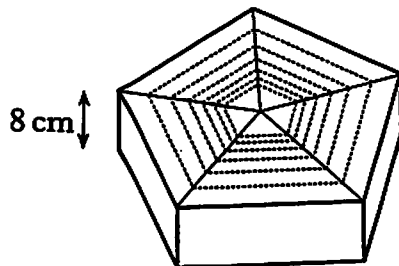


- (a) Calculate the volume of the mug.  
(b) 600 millilitres of coffee are poured in.  
Calculate the depth of the coffee in the cup.

RE  
3

KU	F
2	

- (C) 9. A gift box, 8 centimetres high, is prism shaped.  
(P2)



The uniform cross-section is a regular pentagon.  
Each vertex of the pentagon is 10 centimetres from the centre O.  
Calculate the volume of the box.

KU  
5



# Area / Vol / Length

(Credit Past Paper quest 2003 – 2007)

- (A) 13. A rectangular clipboard has a triangular plastic pocket attached as shown in Figure 1.

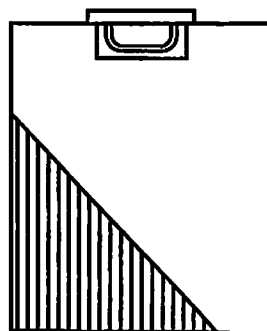


Figure 1

The pocket is attached along edges TD and DB as shown in Figure 2.

B is  $x$  centimetres from the corner C.

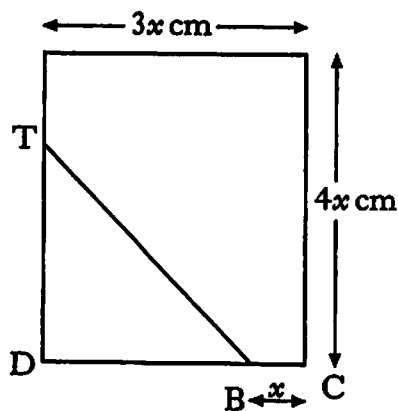


Figure 2

The length of the clipboard is  $4x$  centimetres and the breadth is  $3x$  centimetres.

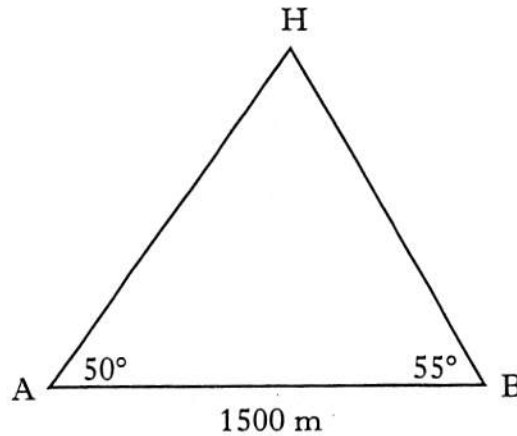
The area of the pocket is a quarter of the area of the clipboard.

Find, in terms of  $x$ , the length of TD.

KU	RE

# Trig (Credit Past Paper quest 2003 – 2007)

- Ⓓ 5. A helicopter, at point H, hovers between two aircraft carriers at points A (P2) and B which are 1500 metres apart.



From carrier A, the angle of elevation of the helicopter is  $50^\circ$ .

From carrier B, the angle of elevation of the helicopter is  $55^\circ$ .

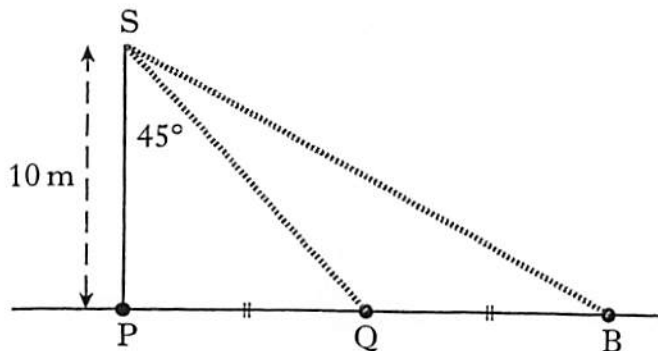
Calculate the distance from the helicopter to the nearer carrier.

RE  
4

Ⓔ

The diagram below shows a spotlight at point S, mounted 10 metres directly above a point P at the front edge of a stage.

The spotlight swings  $45^\circ$  from the vertical to illuminate another point Q, also at the front edge of the stage.

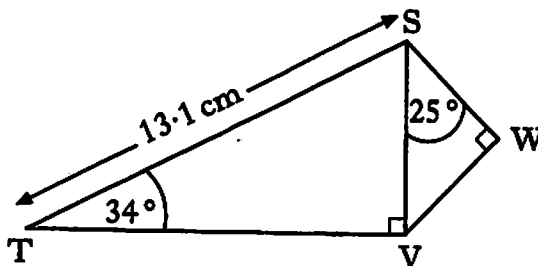


Through how many **more** degrees must the spotlight swing to illuminate a point B, where Q is the mid-point of PB?

KU	RE
	5

# Trig (Credit Past Paper quest 2003 – 2007)

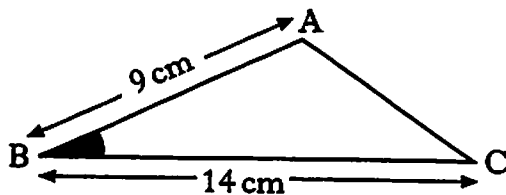
- (P1) 6. In the diagram,  
 (P2) Angle  $STV = 34^\circ$   
 Angle  $VSW = 25^\circ$   
 Angle  $SVT = \text{Angle } SWV = 90^\circ$   
 $ST = 13.1$  centimetres.



Calculate the length of SW.

KU  
4

- (P1) 7. The area of triangle ABC is 38 square centimetres.  
 (P2) AB is 9 centimetres and BC is 14 centimetres.

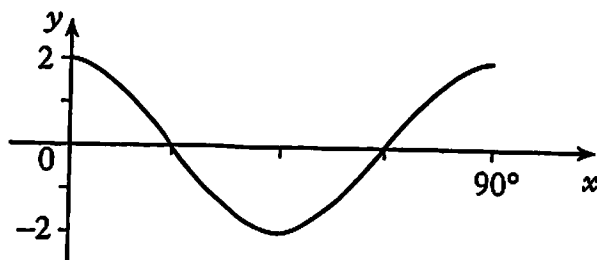


Calculate the size of the acute angle ABC.

KU	RE
	3

- (C) 9. The graph of  $y = a \cos bx^\circ$ ,  $0 \leq x \leq 90$ , is shown below.

(P1)



Write down the values of  $a$  and  $b$ .

KU  
2

# Money (Credit Past Paper quest 2003 – 2007)

(A) 7. Andrew and Doreen each book in at the Sleepwell Lodge.

(P1)

(a) Andrew stays for 3 nights and has breakfast on 2 mornings.

His bill is £145.

Write down an algebraic equation to illustrate this.

(b) Doreen stays for 5 nights and has breakfast on 3 mornings.

Her bill is £240.

Write down an algebraic equation to illustrate this.

(c) Find the cost of one breakfast.

RE  
3

K  
1

1

(B) 1. Alistair buys an antique chair for £600.

(P2) It is expected to increase in value at the rate of 4.5% each year.

How much is it expected to be worth in 3 years?

KU	RE
3	

# Money (Credit Past Paper ans 2003 – 2007)

(A) 7. (a)  $3n + 2b = 145$

(b)  $5n + 3b = 240$

(c) £5

(B) 1. £684.70