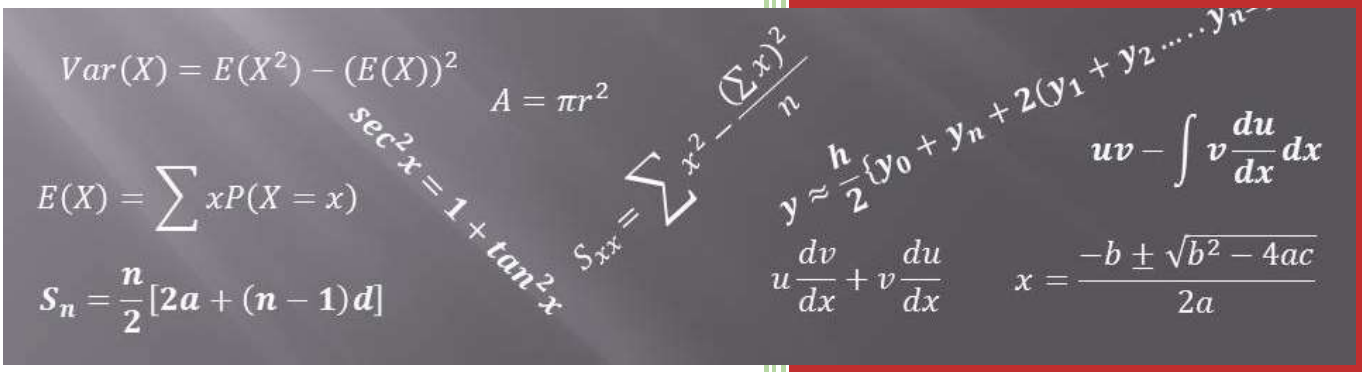
MathsGeeks

Sample GCSE Higher Level Harder Questions and Solutions



Question No.	Mark Scored	Mark
1		8
2		7
3		5
TOTAL		**20**

Calculators Allowed

Time Allowed: 2hrs

Give all answer to 3 significant figures unless otherwise stated

December 2013

MathsGeeks

QUESTIONS (SOLUTIONS BELOW)

Question 1.

(a) Simplify

$$\frac{m^7 \times m^5}{m^2}$$

(2)

(b) Simplify

$$(2x)^3 \times (3x)^2$$

(2)

(c) Simplify

$$5a^2bc^3 \times 6ab^4c^2$$

(2)

(d) Factorise completely

$$6x^2y^2z^3 + 18x^3y^2z^2$$

(2)

Question 1: TOTAL: /8

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Question 2.

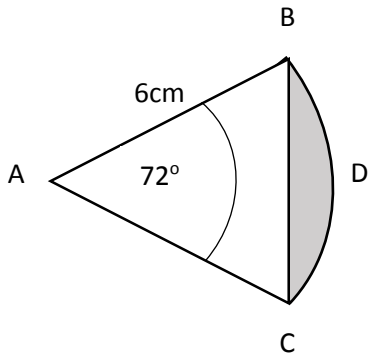

Diagram **NOT** accurately drawn

BAC is a sector of a circle, radius 6 cm.

The angle BAC is 60°.

a) Find the length of BC.

…….. cm **(3)**

b) Work out the area of the shaded region BDC.

Area = ……cm^2 **(4)**

Question 2: TOTAL: /7

Question 3.

a is directly proportional to b.

When $a = 1000$, $b = 25$

(a) Find a formula for a in terms of b.

a = ... (3)

(b) Calculate the value of a when $b = 350$

a = ... (2)

Question 3: TOTAL: /5

.....

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SOLUTIONS

Question 1.

(a) Simplify

$$\frac{m^7 \times m^5}{m^2}$$

If you multiply indices you add them and if you divide you subtract so:

$$\frac{m^{12}}{m^2} = m^{10}.$$

(2)

(b) Simplify

$$(2x)^3 \times (3x)^2$$

$2x \times 2x \times 2x \times 3x \times 3x = 2 \times 2 \times 2 \times 3 \times 3 \times x^5 = 72x^5.$

(2)

(c) Simplify

$$5a^2bc^3 \times 6ab^4c^2$$

$$= 5 \times 6 \times a^2 \times a \times b \times b^4 \times c^3 \times c^2 = 30a^3b^5c^5$$

(2)

(d) Factorise completely

$$6x^2y^2z^3 + 18x^3y^2z^2$$

Find what terms they have in common and bring these out the front of the bracket.

$= 6x^2y^2z^2(z + 3x).$

(2)

Question 1: TOTAL: /8

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Question 2.

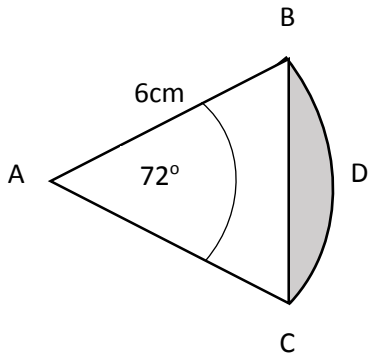

Diagram **NOT** accurately drawn

BAC is a sector of a circle, radius 6 cm.

The angle BAC is 60°.

a) Find the length of BC.

The easiest way to do this is to use the formula for lengths in a scalene triangle, which appear on the front of your formula booklet. As we only have one length we will use the *cos* formula.

$a^2 = b^2 + c^2 - 2bc\cos A = 6^2 + 6^2 - 2(6)(6)\cos 72 = 49.75$

$a = BC = 7.05\ (3.s.f) cm.$

…….. cm **(3)**

b) Work out the area of the shaded region BDC.

The area of the shaded shape is the area of the sector minus the area of triangle.

The area of the sector is going to be $\frac{72}{360} \times \pi \times 6 \times 6 = 22.6\ cm^2$.

The area of the triangle is given by the formula on the front of the exam paper

$Area = \frac{1}{2}ab\sin C = \frac{1}{2}(6)(6)\sin 72 = 17.119\ cm^2$.

Therefore the area of the shaded shape is $22.6 - 17.119 = 5.48\ (3.s.f) cm^2$.

Area = ……cm^2 **(4)**

Question 2: TOTAL: /7

……

Question 3.

a is directly proportional to *b*.

When *a* = 1000, *b* = 25

(a) Find a formula for *a* in terms of *b*.

$a \propto b$
$a = kb$
$1000 = k \times 25$ and $k = 40$

Therefore $a = 40b$

a = ... (3)

(b) Calculate the value of *a* when *b* = 350

Simply substitute b into the formula you derived above. So

$$a = 40 \times 350 = 14000$$

a = ... (2)

Question 3: TOTAL: /5

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THE END

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