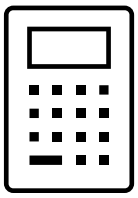
Surname:	Forename(s):

GCSE Mathematics

Expand Triple Brackets

ANSWERS

Grade 6



These questions get more difficult as your go through this paper.

This topic could come up on a calculator paper and non-calculator paper.

Materials

- **Formulae Sheet** (on the next page)
- **Black** ink or ball-point pen
- Pencil
- Eraser
- Protractor
- Compass
- Tracing Paper
- **Calculator allowed**

Instructions

- Show **all** of your working.
- Draw diagrams in pencil.
- Plot graphs in pencil.
- Diagrams are **not** accurately drawn, unless otherwise indicated.

Higher Tier Formulae Sheet

Perimeter, Area and Volume

Where a and b are the lengths of the parallel sides and h Is their perpendicular separation:

Area of a trapezium = ½ (a + b) h

Volume of a prism = area of cross section x length

Where r is the radius and d is the diameter:

Circumference of a circle = 2πr = πd

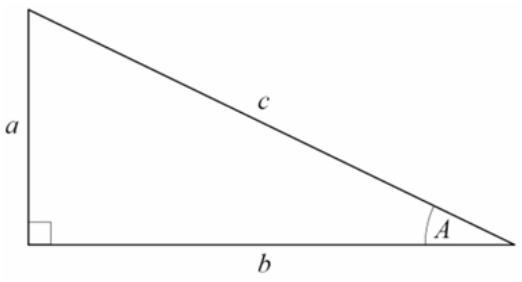
Area of a circle = πr^2

Quadratic Formula

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

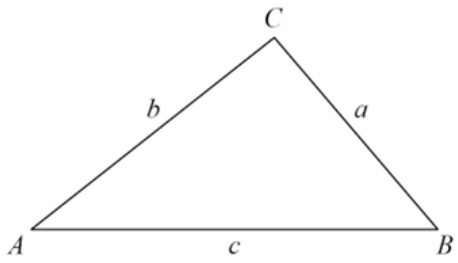


In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \qquad \cos A = \frac{b}{c} \qquad \tan A = \frac{a}{b}$$



In any triangle ABC where a, b and c are the length of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle } = \frac{1}{2} ab \sin C$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P\left(1 + \frac{r}{100}\right)^n$$

Probability

Where P (A) is the probability of outcome A

and P (B) is the probability of outcome B:

P (A or B) = P (A) + P (B) – P (A and B)

P (A and B) = P (A given B) P(B)

1 Expand and simplify $(x+1)(x+2)(x+3)$

$(x+1)(x+2)$

$x^2+2x+x+2 = x^2+3x+2$

$(x+3)(x^2+3x+2)$

$x^3+3x^2+2x+3x^2+9x+6$

$x^3+6x^2+11x+6$

$x^3+6x^2+11x+6$

(Total for question 1 is 3 marks)

2 Expand and simplify $(x-4)(x+3)(x-5)$

$(x-4)(x+3)$

$x^2+3x-4x-12 = x^2-x-12$

$(x-5)(x^2-x-12)$

$x^3-x^2-12x-5x^2+5x+60$

$x^3-6x^2-7x+60$

$x^3-6x^2-7x+60$

(Total for question 2 is 3 marks)

3 Expand and simplify $(2x+3)(x-1)(x+2)$

$(2x+3)(x-1)$

$2x^2-2x+3x-3 = 2x^2+x-3$

$(x+2)(2x^2+x-3)$

$2x^3+x^2-3x+4x^2+2x-6$

$2x^3+5x^2-x-6$

$2x^3+5x^2-x-6$

(Total for question 3 is 3 marks)

4 Expand and simplify $(x-4)(x-6)^2$

$(x-4)(x-6)(x-6)$

$(x-4)(x-6)$

$x^2-6x-4x+24 = x^2-10x+24$

$(x-6)(x^2-10x+24)$

$x^3-10x^2+24x-6x^2+60x-144$

$x^3-16x^2+84x-144$

$x^3-16x^2+84x-144$

(Total for question 4 is 3 marks)

5 Expand and simplify $(3x - 2)(x + 1)(5x - 2)$

$(3x-2)(x+1)$

$3x^2 + 3x - 2x - 2 = 3x^2 + x - 2$

$(5x-2)(3x^2+x-2)$

$15x^3 + 5x^2 - 10x - 6x^2 - 2x + 4$

$15x^3 - x^2 - 12x + 4$

$15x^3 - x^2 - 12x + 4$

(Total for question 5 is 3 marks)

6 Expand and simplify $(2x + 3)^3$

$(2x+3)(2x+3)(2x+3)$

$(2x+3)(2x+3)$

$4x^2 + 6x + 6x + 9 = 4x^2 + 12x + 9$

$(2x+3)(4x^2+12x+9)$

$8x^3 + 24x^2 + 18x + 12x^2 + 36x + 27$

$8x^3 + 36x^2 + 54x + 27$

$8x^3 + 36x^2 + 54x + 27$

(Total for question 6 is 3 marks)

7 Expand and simplify $(3x + 1)^2 (11x + 5)$

$(3x+1)(3x+1)(11x+5)$

$(3x+1)(3x+1)$

$9x^2 + 3x + 3x + 1 = 9x^2 + 6x + 1$

$(11x+5)(9x^2+6x+1)$

$99x^3 + 66x^2 + 11x + 45x^2 + 30x + 5$

$99x^3 + 111x^2 + 41x + 5$

$99x^3 + 111x^2 + 41x + 5$

(Total for question 7 is 3 marks)

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8 A cube has a side length of $(5x - 4)$ cm
Find an expression for the volume of the cube.
Give your answer in its simplest form.

volume = b × L × h

$= (5x-4)(5x-4)(5x-4)$

$(5x-4)(5x-4)$

$25x^2 - 20x - 20x + 16 = 25x^2 - 40x + 16$

$(5x-4)(25x^2-40x+16)$

$125x^3 - 200x^2 + 80x - 100x^2 + 160x - 64$

$125x^3 - 300x^2 + 240x - 64$

$125x^3 - 300x^2 + 240x - 64$ cm^3

(Total for question 8 is 3 marks)