



CITY AND ISLINGTON SIXTH FORM COLLEGE

MATHS

BRIDGING ASSIGNMENT (GCSE TO A LEVEL)

These questions are mostly non-calculator GCSE Higher Tier. They are designed to highlight some of the skills you will need for the first few weeks of the A Level Maths course.

You may have to review some of the work, try the following online resources to help:

<https://www.examsolutions.net/gcse-maths/>

<https://www.mathsgenie.co.uk/gcse.html> (look for the grade 7/8/9 material)

<https://www.youtube.com/user/HEGARTYMATHS>

Please bring this with you to the first lesson – your teacher will check how much you have completed!

Do not use a calculator. Show working out clearly.

If you would like to do some extra preparation or you just like a challenge then check out these

online courses:

<https://www.accessheonline.ac.uk/courses/mathematics-short-e-course/>

<https://www.futurelearn.com/courses/precalculus>

<https://www.futurelearn.com/courses/maths-puzzles>

<https://www.futurelearn.com/courses/flexagons>

<https://www.futurelearn.com/courses/recreational-math>

<https://www.futurelearn.com/courses/advanced-precalculus>

Full Name: _____

College ID: _____

Comments: _____

I feel confident with sections/ topics/ questions

I would like more practice in the sections/ topics/ questions

I need support in the sections/ topics/ questions

Class: _____

Teacher: _____

Let your teacher know if you have completed any of these courses!

Show your working out clearly please. Write in the space provided.

Section 1 – Fractions Calculate and simplify where possible.

a. $\frac{1}{4} + \frac{3}{8} - \frac{5}{7}$

..... [1]

b. $\frac{7}{6} \times \frac{24}{35} \div \frac{20}{3}$

..... [1]

c. $\left(6 \times \frac{3}{7}\right) - \frac{4}{7}$

..... [1]



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Section 1 – Fractions

d. $\left(6\frac{3}{7}\right) - \frac{4}{7}$

..... [1]

e. $\frac{x}{7} \times \frac{x+2}{9}$

..... [1]

f. $\frac{3-x}{7} + \frac{2}{9+x}$

..... [2]

Section 2 – Surds

a. Rationalise the denominator of $\frac{2}{\sqrt{5}}$

..... [1]

b. Simplify $(2 - \sqrt{3})(4 + \sqrt{3})$

..... [2]

c. Write $\frac{3+\sqrt{2}}{8+\sqrt{2}}$ in the form $\frac{a+b\sqrt{2}}{c}$ where a, b and c are all integers.

..... [2]

Section 3 – Indices Simplify the following:

a. (i) $27^{\frac{1}{3}}$ (ii) $27^{\frac{4}{3}}$ (iii) 3^{-4} (iv) $27^{-\frac{4}{3}}$

..... [4]



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Section 3 – Indices Simplify the following:

b. $\frac{45e^6 \times 2f^8}{5ef^2}$

..... [1]

c. $(2xy^2)^5$

..... [1]

d. $\left(\frac{27}{8}\right)^{\frac{2}{3}}$

..... [1]

e. $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

..... [1]

Section 4 – Algebra

a. Make ? the subject of the equation: $2(2a - c) = 5c + 1$

..... [4]

b. Make ? the subject of the equation: $\frac{3x}{x-3} = 2y$

..... [1]



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Section 4 – Algebra

c. Factorise completely: $8y^2 - 24xy$

..... [4]

d. Expand these brackets: $(x + 2)^3$

..... [1]

Section 5 – Equations Solve to find x

a. $3(2 - x) - 4(3 - 2x) = 14$

..... [1]

b. $\frac{3x-5}{5} + \frac{x-3}{3} = 6$

..... [2]

c. $x^2 + 4x - 45 = 0$

..... [2]

d. $\frac{x}{2} - \frac{2}{x+1} = 1$

..... [2]

e. Solve this equation using three different methods: ' $x^2 + 6x + 8 = 0$
(i) By completing the square (ii) By using the quadratic formula (iii) By factorisation

..... [6]

f. Solve: $3x^2 + 19x + 28 = 0$

..... [2]



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Section 6 – Simultaneous equations Solve to find x and y :

a. $3x + 5y = 19$
 $4x - 2y = -18$

.....[3]

b. $x^2 + y^2 = 26$
 $y + 6 = x$

.....[3]

Section 7 – Straight lines and coordinate geometry

a. The equations of five straight lines are

$$y = x - 2 \qquad y = -x + 3 \qquad y = 3x + 2$$

$$y = 5x + 2 \qquad y = 3x - 3.$$

Two of the lines go through the point $(0, 2)$.

(i) Write down the equations of these two lines.

Two of the lines are parallel.

(ii) Write down the equations of these two lines.

Two of the lines are perpendicular

(iii) Write down the equations of these two lines.

.....[3]

b. $A(-2,1)$, $B(6,5)$ and $C(4,k)$ are the vertices of a right-angled triangle ABC .

Angle ABC is the right angle.

(i) Find the midpoint of the line segment AB

(ii) Find the gradient of the line segment AB

(iii) Find an equation of the line that passes through A and B .

Give your answer in the form $ay+bx=c$ where a , b and c are integers.

.....[8]



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Section 8 – Reasoning & Mathematical Proof

- a. Here are the first 5 terms of an arithmetic sequence.

3 9 15 21 27

- (i) Find an expression, in terms of n , for the n th term of this sequence.

Ben says that 150 is in the sequence.

- (ii) Is Ben right?

You must explain your answer.

..... [3]

- b. Prove that $(3x + 1)^2 - (3x - 1)^2$ is a multiple of 4, for all positive integers x .

..... [3]

- c. For any three consecutive numbers, prove that the difference between the square of the middle number and the product of the smallest and largest is always 1.

..... [3]

Section 9 – Trigonometry Solve the equations below in the range $0 < x < 360$:

- a. $\sin x = 0.5$

..... [2]

- b. $\cos x = 1$

..... [2]

- c. $\tan x = \frac{1}{\sqrt{3}}$

..... [3]



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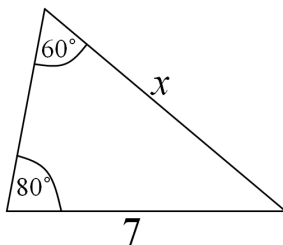
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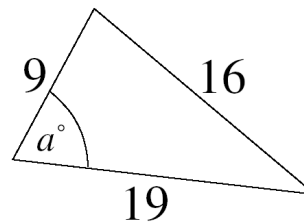
Section 9 – Trigonometry Solve the equations below in the range $0 < x < 360$:

Find the missing side or angle in the following triangles

d.



e.



..... [4]

Section 10 – Calculus

You may need to do some research to complete this question.

These resources may help you: • [examsolutions.net](https://www.examsolutions.net)

<https://www.examsolutions.net/tutorials/gradient-function-dydx/?level=ALevel&board=Edexcel&module=Pure-Maths-A-Level&topic=1256>

<https://www.examsolutions.net/tutorials/differentiation/?level=ALevel&board=Edexcel&module=Pure-Maths-A-Level&topic=1256>

- [khanacademy.org](https://www.khanacademy.org)
- Wikipedia
- [wolframalpha.com](https://www.wolframalpha.com)

a. Briefly explain what is meant by differentiation in mathematics.

..... [1]



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Section 10 – Calculus

b. Differentiate the following:

(i). $y = 3x^2$

..... [1]

(ii). $y = 10x^4$

..... [1]

(iii). $y = \frac{3}{x}$

..... [1]

(iv). $y = 4x^2 - 2x^6 + 5$

..... [2]

(v). $y = 2x - \sqrt{x}$

..... [2]

TOTAL MARKS: 85