

## Topic 24 Inequalities and graphs (Pre-TT) [46] MARKSCHEME

1.

(a)  $y = x + 1, y = -x - 2$  B1  
 $x + 1 = -x - 2$

$-x - 2 = x^2 + 2x - 3$  M1

(b)  $x^2 + 3x - 1 = 0$  A1  
*Simplified to 3 terms in  $x^2, x$  and constant*  
*e.g.  $x^2 = 1 - 3x$*

$x^2 + 2x - 3 = x + 1$  M1

(c) 1.6, -2.6 A1  
*Accept 1.5 to 1.6, -2.5 to -2.6*

[5]

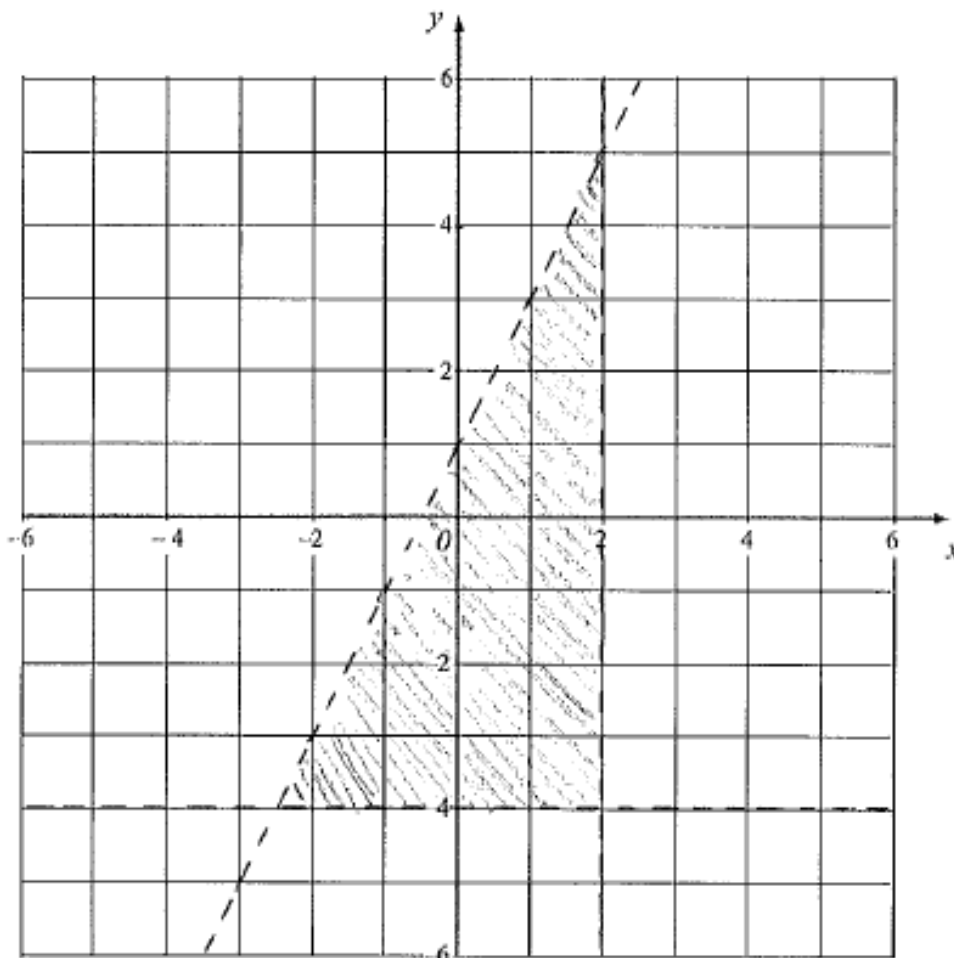
2.

Attempt to factorise:  $(x + 3)(x + 1) > 0$  [M1]  
 Sketch of concave-up curve (since  $+x^2$ )... [B1]  
 ...with roots at  $x = 3$  and  $x = -1$  [M1]  
 $> 0$  means above the  $x$  - axis  
 $x < -3$  or  $x > -1$  [A1]

3.

[B1] for each correct line

[A1] for the correct region shaded



4.

Graph A is  $y = (x - 3)^2$

B1

Graph B is  $y = (x + 3)^2$

B1

Graph C is  $y = -x^2$

B1

Graph D is  $y = 3 - x^2$

B1

[4]

5.

Sketch of concave-down curve (since  $-x^2$ )...

[B1] oe

...with roots at  $x = 4$  and  $x = -3$

[B1]

$> 0$  means above the  $x$  - axis

$-3 < x < 4$

[A1]

6.

(a)  $x = -2, y = 5$

B1

$x = 3, y = 0$

B1

(b) Plot points

B1

Join with smooth curve

B1

(c)  $x = 3, -1$

B1

*Accept (3,0), (-1,0)*

(d)  $x^2 - 2x - 3 = -x + 1$

M1

*Or subtraction:*

$x^2 - 2x - 3 - (x^2 - x - 4)$

Draw  $y = 1 - x$

B1 ft

*Draw line (not  $y = k$ )*

$x = 2.6$  to  $2.5$  and  $-1.6$  to  $-1.5$

A1

*Inclusive*

[8]

7.

(6, -1)	M1 for a method showing the translation of a graph or a correct coordinate A1 cao
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8.

Use of quadratic formula:

[M1]

Roots of  $x = 1.38$  and  $x = 3.62$

[A1]

Sketch of concave-up curve (since  $+x^2$ )...

[B1]

$< 0$  means below the  $x$  - axis

$1.38 < x < 3.62$

Integer values are 2 and 3

[A1, A1]

9.

Attempt at  $y = x - 1$

M1

'm' or 'c' correct ( $y = -1$  scores M0)

Table of values seen with at least one pair correct, with attempt at line, earns M1

Correct ruled line

A1

$-2.6 \leq x \leq -2.5$

and  $1.5 \leq x \leq 1.6$

A1ft

ft their line, two solutions only, tolerance of  $\pm 0.05$

[3]

10.

(a)	(i)	$y \leq 9$ and $y > x$	<b>2</b> 1 AO1.2 1 AO2.3a	<b>B1</b> for each	Condone $y \geq x + 1$ instead of $y > x$
(a)	(ii)	$x = 4$ ruled $y = 9$ ruled  $y = x$ broken line    Correct region left unshaded	<b>1</b> <b>1</b>     <b>1</b> 2 AO1.3b 1 AO2.3a 1 AO2.3b		Condone lines broken/solid Ignore any labels on lines All lines fit for purpose to enclose correct region  Passes within 1 mm of (0, 0) and (9, 9), extended if necessary Condone $y = x + 1$ ruled only after $y \geq x + 1$ in part (a)(i) <u>Ignore additional incorrect lines drawn (as working possibly for part (b))</u>
(b)		5 apples and 6 oranges	<b>2</b> 1 AO2.1b 1 AO3.1c	<b>M1</b> for a calculation shown of the form $[0.]45x + [0.]3y$ where (x, y) is clearly in their region and both x and y are integers	