Year 10 Adv   Non Linear Graphs and Trigonometry Test   —[CRANBROOK]

Name: _____   _____ Time Allowed 45min

Circle Teacher CJD, GC, BMM

Section A   Marked by GC   13 marks

Choose the most correct answer to Questions 1-13

(1) $y = x$

(a)   (b)   (c)   (d)

(2) $y = \frac{1}{x}$

(a)   (b)   (c)   (d)

(3) $y = x^3$

(a)   (b)   (c)   (d)

(4) $y = -x^2$

(a)   (b)   (c)   (d)

(5) $y = -x$

(a)   (b)   (c)   (d)

(6) $y = 1$

(a)   (b)   (c)   (d)

(7) $y = 1 - x$

(a)   (b)   (c)   (d)

(8) $y = 1 - x^2$

(a)   (b)   (c)   (d)
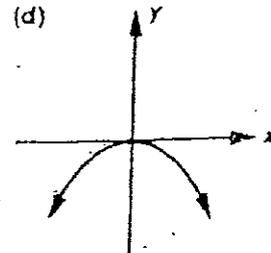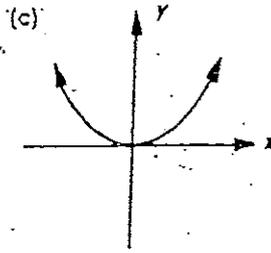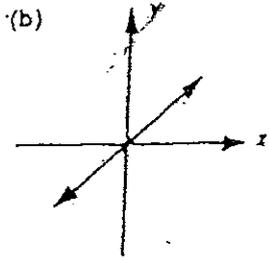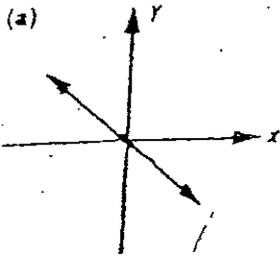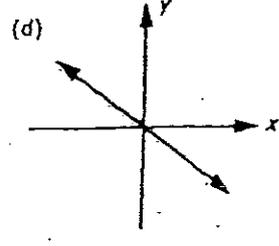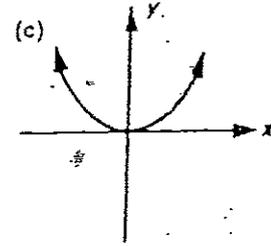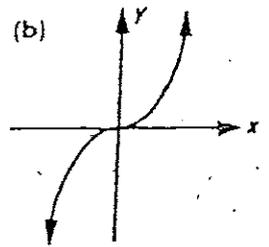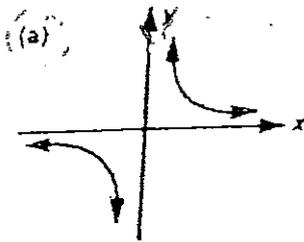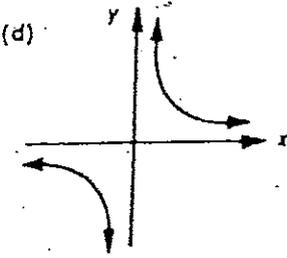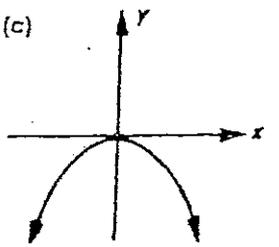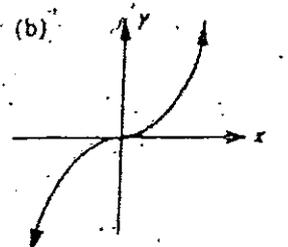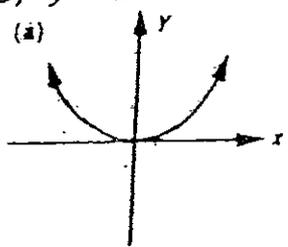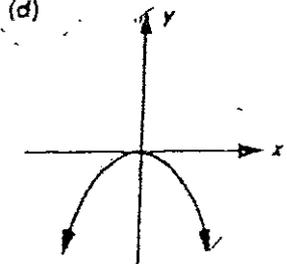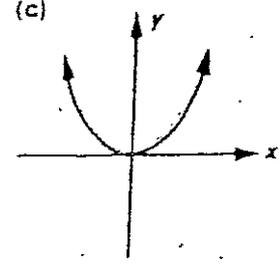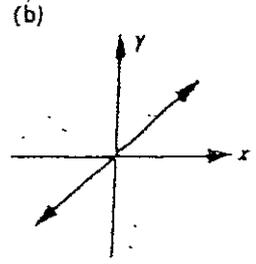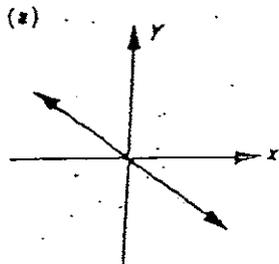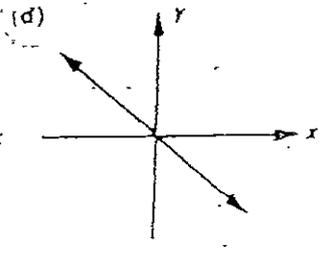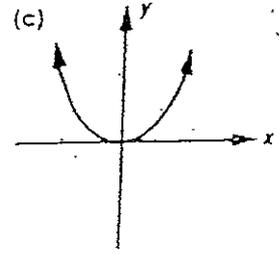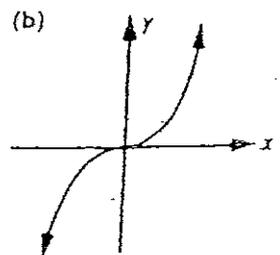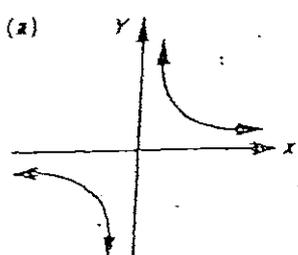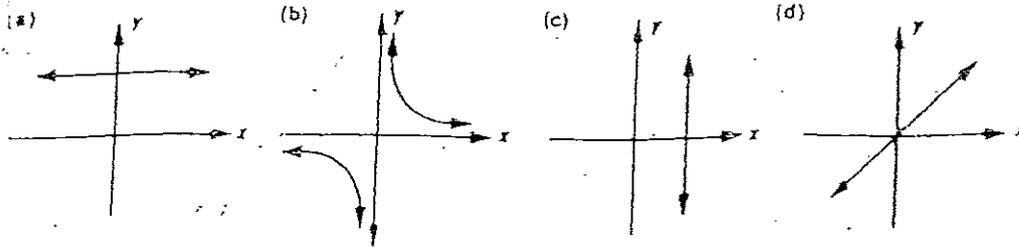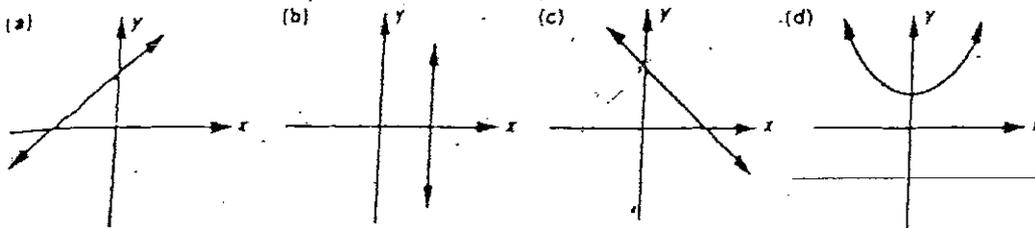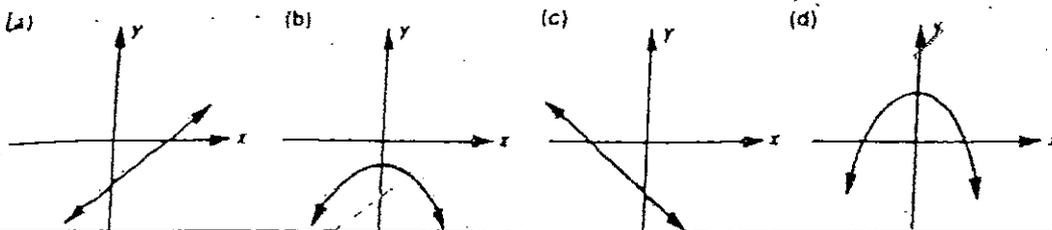
(9) Which of the following graphs best represents $y = \dfrac{2}{x}$?

(a)   (b)   (c)   (d)
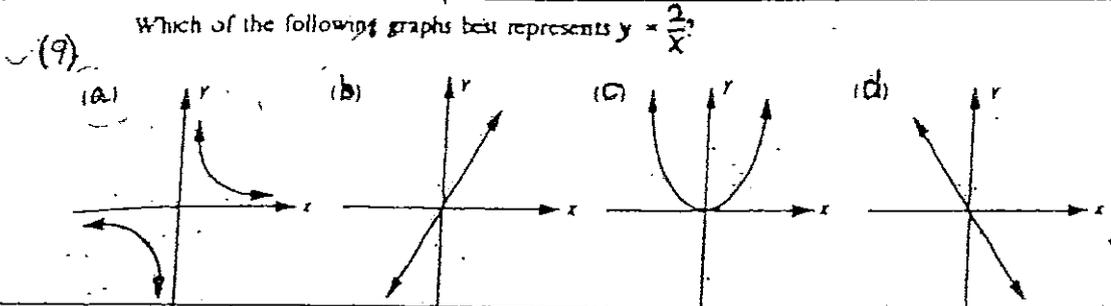
(10) Which graph could best represent $y = 2x - 1$?

(a)   (b)   (C)   (d)

(11)
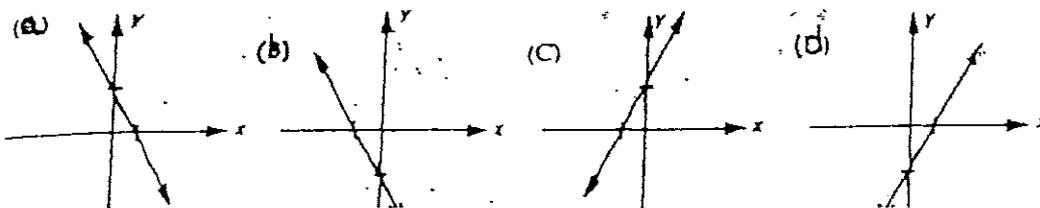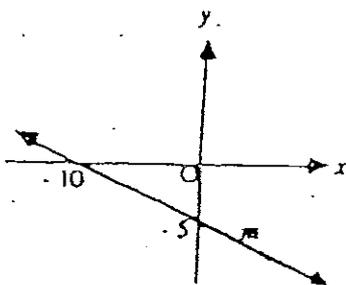
The equation of the line m is

(A) $x - 2y - 10 = 0$

(B) $2x - y - 5 = 0$

(C) $x + 2y + 10 = 0$

(D) $2x + y + 5 = 0$

(12) The graph $y = 2x^2 + b$ passes through the point $(-3, 4)$.

What is the value of b?

(A) -35 (B) -32 (C) -14 (D) 22

(13)
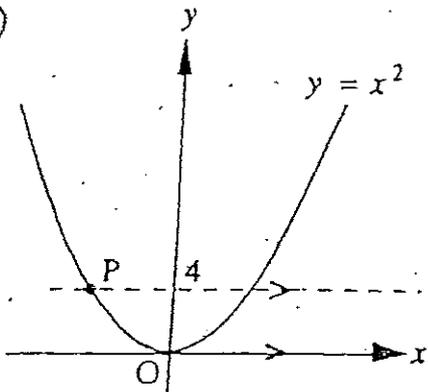
The coordinates of the point P are

(A) $(-2, 4)$ (B) $(-4, 2)$

(C) $(-4, 16)$ (D) $(-16, 4)$

Name: _____

Time Allowed 45min

Circle Teacher: CJL, GC, BMM

Section B   Marked by CJL   24 marks

a.   For the expression $xy = 12$, answer the following questions

  i   Fill in the table below   1

x	-12	-6	-1	1	6	12
y						

  ii   Sketch the expression on the axes below labelling any asymptotes   2
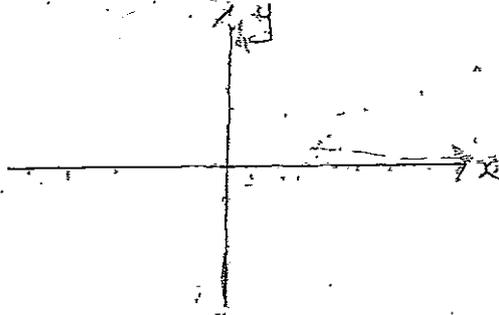
b.   Write down the equation of the figure below   1
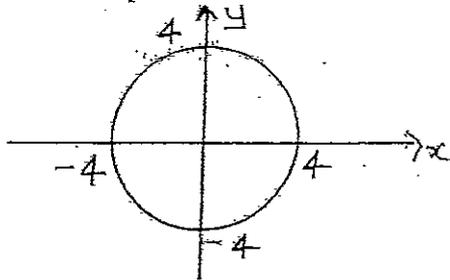
c.   On the same set of axes below sketch the graphs of $y = 4^x$ and $y = 4^{-x}$, labelling Each graph clearly and showing any intercepts with the axes.   3

6
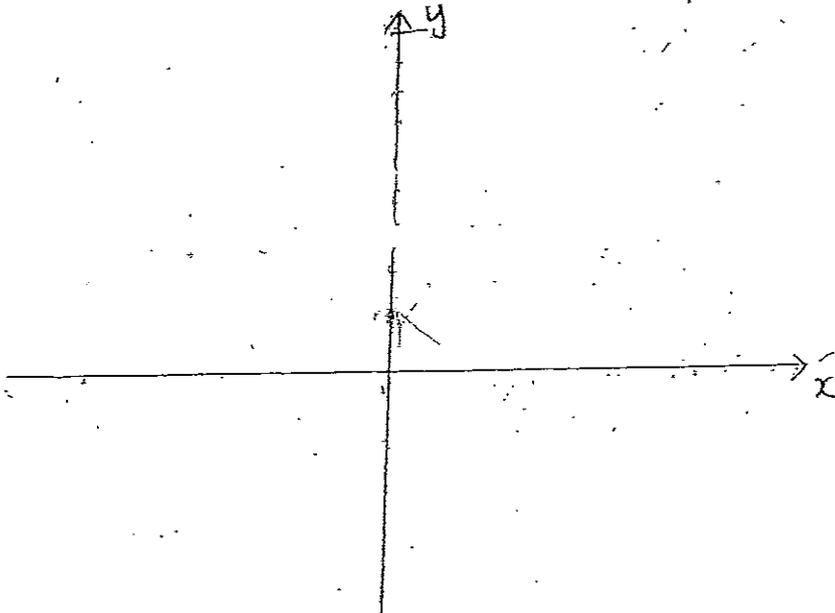
d. Sketch $y = \frac{1}{2}x^3 - 1$ on a set of axes showing x and y intercepts. 2

Draw the graph of the following equation $y = \sqrt{16 - x^2}$ 2

f. What is the equation of a circle with centre the origin and radius $2\sqrt{3}$ units 1

g. Consider the parabola $y = x^2 - 6x + 10$

i Find the y-intercept

ii Find the equation of the axis of symmetry

iii Find the co-ordinates of the vertex 2

iv Use this information to draw a clear sketch of the curve 2

h. For the function $y = (x-2)^2 - 3$:

i. Find the equation of the axis of <u>symmetry</u>   1

ii. Find the coordinates of the vertex   1

iii. Graph the function, showing the information above and also
any intercepts with the axes. (Note: Please give the x intercepts in exact
value form)   4

Name: Sam Kazacos   Time Allowed 45min

Circle Teacher: CJL, GC, BMM

Section C   Marked by BMM   13 marks

13

a.   i   If $0° < x < 90°$, show that $\sin(90° - x) = \cos x$ 2

(Hint: Start with a right-angled triangle and let one of the other angles be x)

ii   Hence, simplify $\dfrac{\cos 26°}{\sin 64°}$ 1

iii   Find the exact value of $\sin 30° + \cos 30°$ 2

b.   Find the value of θ to the nearest minute   4

i

ii
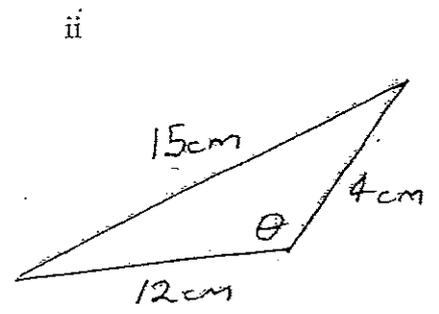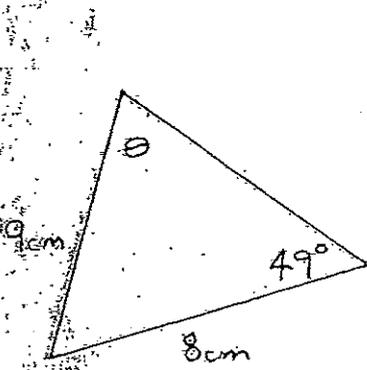
c. A large paddock has dimensions shown. Calculate the length of CD
(correct to the nearest m).

4

B

98°

900m

47° C

A 45°

x

700 m

D
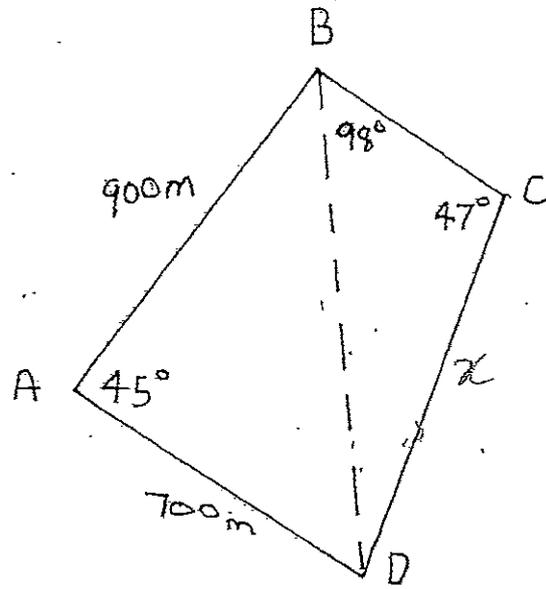
SECTION (A)

(1) B
(2) A
(3) B
(4) D
(5) D
(6) A
(7) C
(8) D
(9) A
(10) D
(11) C
(12) C
(13) A

SECTION (B)

(a)
(i)

| x	-12	-6	-1	1	6	12
y	-1	-2	-12	12	2	1

(ii)

(6,2) (-6,-2) $y=0$ asymptotes $x=0$

(b) $\boxed{x^2 + y^2 = 16}$

(c) $y = 4^{-x}$ $y = 4^x$

Asymptote $y=0$

(d)

(1·25, 0)

$y = \tfrac{1}{2}x^3 - 1$

$\boxed{\begin{array}{l} x=0 \Rightarrow y=-1 \\ y=0 \Rightarrow x=\sqrt[3]{2} \end{array}}$
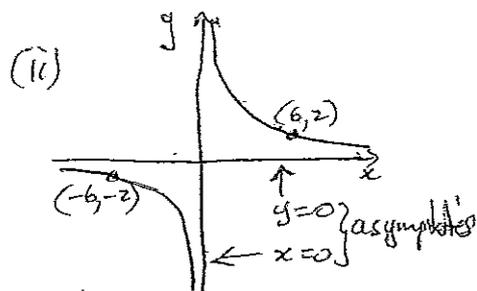
(e) $y = \pm\sqrt{16 - x^2}$
∴ $y^2 = 16 - x^2$
∴ $x^2 + y^2 = 16$
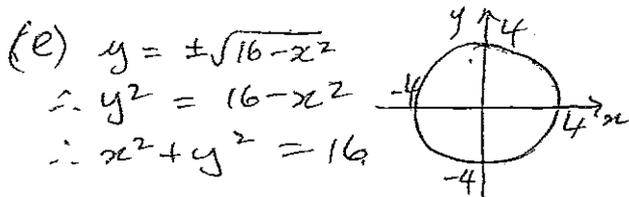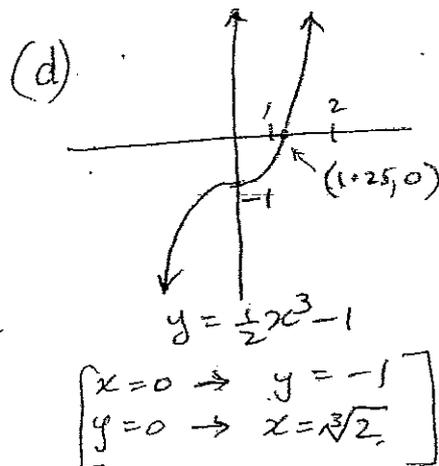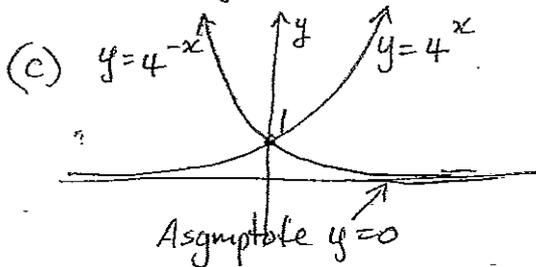
(f) $x^2 + y^2 = (2\sqrt{3})^2$
∴ $\boxed{x^2 + y^2 = 12}$
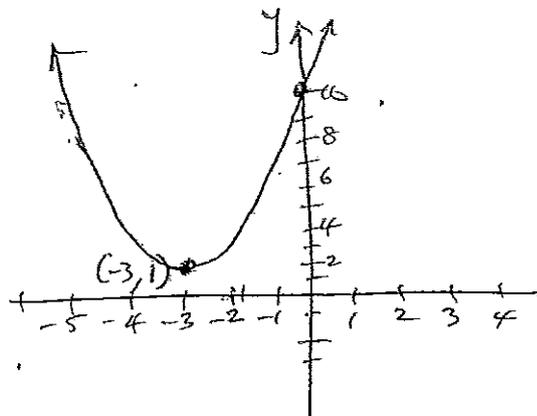
(g) $y = x^2 + 6x + 10$

i) $x = 0 \Rightarrow y = 10$

ii) $x = -\dfrac{b}{2a} \Rightarrow \boxed{x = -3}$

iii) $y = (-3)^2 + 6(-3) + 10 = 1$
∴ $\boxed{\text{Vertex} = (-3, 1)}$


(-3,1)

(h) $y = (x-2)^2 - 3$

i) $y = x^2 - 4x + 1$
Axis of Symmetry at:
$x = -\dfrac{b}{2a} \Rightarrow \boxed{x = 2}$

ii) $V = (2, -3)$

iii) at $x=0 \to y = (0-2)^2 - 3 = 1$
at $y=0 \to 0 = (x-2)^2 - 3$
$3 = (x-2)^2$
$\pm\sqrt{3} = x-2$
$2 \pm \sqrt{3} = x$

V(2,-3)

SECTION C

(a) i)
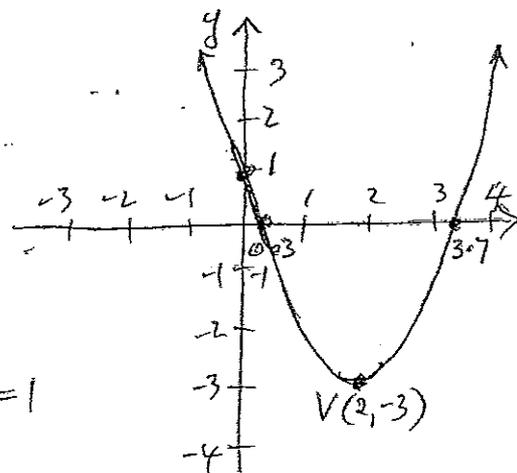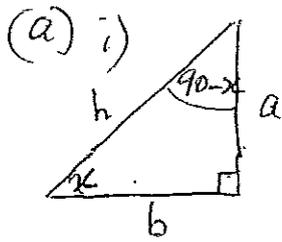
$\sin(90-x) = \dfrac{b}{h}$

$\cos(x) = \dfrac{b}{h}$

$\therefore \sin(90-x) = \cos x$

ii) $= \dfrac{\sin 64°}{\sin 64°}$

$= 1$

iii) $= \dfrac{1}{2} + \dfrac{\sqrt{3}}{2}$

$= \dfrac{1 + \sqrt{3}}{2}$

(b) (i) $\dfrac{\sin\theta}{8} = \dfrac{\sin 49}{9}$

$\therefore \sin\theta = \dfrac{8\sin 49}{9} = 0.67$

$\therefore \theta = 42°8'$

ii) $\cos\theta = \dfrac{12^2 + 4^2 - 15^2}{2 \times 12 \times 4}$

$= -0.6770$

$\therefore \theta = 132°37'$

(c) $BD^2 = 900^2 + 700^2 - 2 \times 900 \times 700 \cos 45°$ (Cosine Rule)

$\triangle ABD$

$= 1300000 - 1280000 \times \dfrac{1}{\sqrt{2}}$

≈ 409045

$\therefore BD \approx 639.57$

Using the SINE Rule in $\triangle BCD$:

$\dfrac{x}{\sin 98°} = \dfrac{639.57}{\sin 47°}$

$\therefore x = \dfrac{639.57 \times \sin 98°}{\sin 47°}$

$= 865.99 \approx 866 \, m$. (nearest metre)