GR 10 MATHS – TRIG INVESTIGATION & EXERCISE

ANSWERS

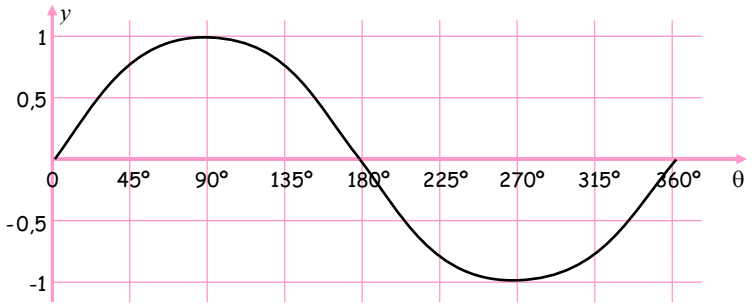
An investigation

1.1

θ	0°	20°	45°	70°	90°	110°	135°	160°	180°
sin θ	0	0,34	0,71	0,94	1	0,94	0,71	0,34	0

θ	180°	200°	225°	250°	270°	290°	315°	340°	360°
sin θ	0	-0,34	-0,71	-0,94	-1	-0,94	-0,71	-0,34	0

1.2

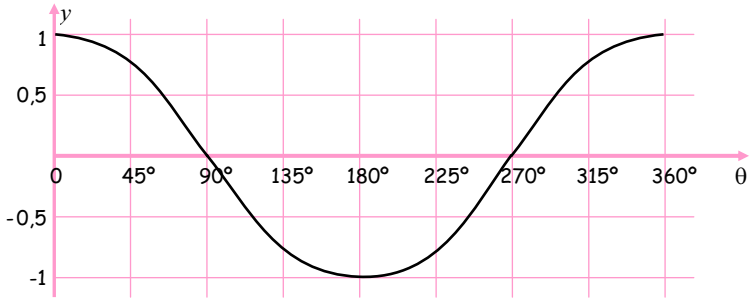


2.1

θ	0°	20°	45°	70°	90°	110°	135°	160°	180°
cos θ	1	0,94	0,71	0,34	0	-0,34	-0,71	-0,94	-1

θ	180°	200°	225°	250°	270°	290°	315°	340°	360°
cos θ	-1	-0,94	-0,71	-0,34	0	0,34	0,71	0,94	1

2.2



3.1

θ	0°	20°	45°	70°	90°	110°	135°	160°	180°
tan θ	0	0,36	1	2,75	?	-2,75	-1	-0,36	0

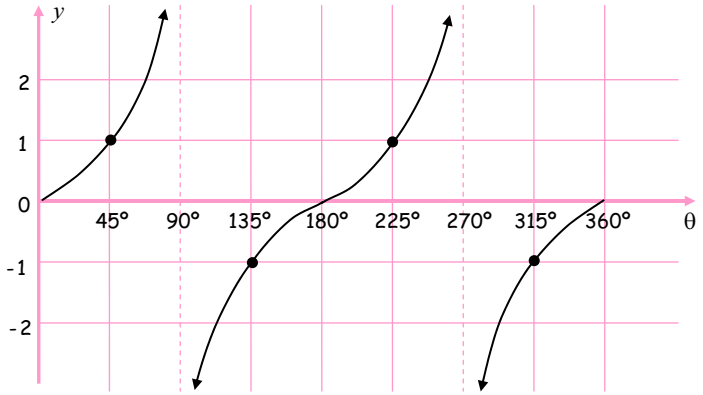
θ	180°	200°	225°	250°	270°	290°	315°	340°	360°
tan θ	0	0,36	1	2,75	?	-2,75	-1	-0,36	0

3.2

θ	80°	85°	89°	89,9°	90°	90,1°	91°	95°	100°
tan θ	6	11	57	572	?	-572	-57	-11	-6

θ	260°	265°	269°	269,9°	270°	270,1°	271°	275°	280°
tan θ	6	11	57	572	?	-572	-57	-11	-6

3.3



4.

	Quadrant number	sin θ	cos θ	tan θ
θ: 0° ➡ 90°	I	increases from 0 to 1	decreases from 1 to 0	increases from 0 to ∞
θ: 90° ➡ 180°	II	decreases from 1 to 0	decreases from 0 to -1	increases from -∞ to 0
θ: 180° ➡ 270°	III	decreases from 0 to -1	increases from -1 to 0	increases from 0 to ∞
θ: 270° ➡ 360°	IV	increases from -1 to 0	increases from 0 to 1	increases from -∞ to 0

5.

	I	II	III	IV
sin θ positive	✓	✓		
cos θ positive	✓			✓
tan θ positive	✓		✓	

	I	II	III	IV
sin θ negative			✓	✓
cos θ negative		✓	✓	
tan θ negative		✓		✓

6.

	sin θ	cos θ	tan θ
Maximum value	1	1	*There is no max or min value*
Minimum value	-1	-1	

7.

	Amplitude	Period	Range
y = sin θ	1	360°	$-1 \leq y \leq 1$
y = cos θ	1	360°	$-1 \leq y \leq 1$
y = tan θ	none	180°	$(-\infty; \infty)$

8. $x = 90°$ and $x = 270°$

9. f(0°) = 0; g(0°) = 1 and h(0°) = 0

f(90°) = 1; g(180°) = -1 and h(315°) = -1

10.1 (a) θ = 0°; 180° or 360° (b) θ = 90° (c) θ = 270°

(d) θ = 20° or 160° (e) θ = 200° or 340° (f) no solution

(g) θ = 70° or 110° (h) θ = 250° or 290° (i) no solution

10.2 (a) θ = 90° or 270° (b) θ = 0° or 360° (c) θ = 180°

(d) θ = 70° or 290° (e) θ = 110° or 250° (f) no solution

(g) θ = 20° or 340° (h) θ = 160° or 200° (i) no solution

10.3 (a) θ = 0°; 180° or 360° (b) θ = 45° or 225° (c) θ = 135° or 315°

(d) θ = 20° or 200° (e) θ = 160° or 340° (f) θ = 70° or 250°

(g) θ = 110° or 290° (h) θ = 89,9° or 269,9° (i) θ = 90,1° or 270,1°

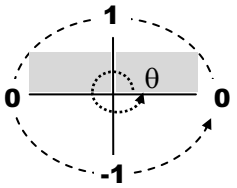
(j) tan θ is undefined when θ = 90° or 270°

EXERCISE 6.8
Exploring the role of a and q in trigonometric functions
ANSWERS

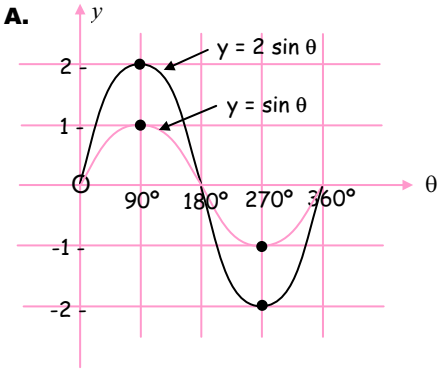
A & B: 1. The table of values and the sketches

	0°	90°	180°	270°	360°
(y =) sin θ	0	1	0	-1	0
(y =) 2 sin θ	0	2	0	-2	0
(y =) sin θ + 1	1	2	1	0	1

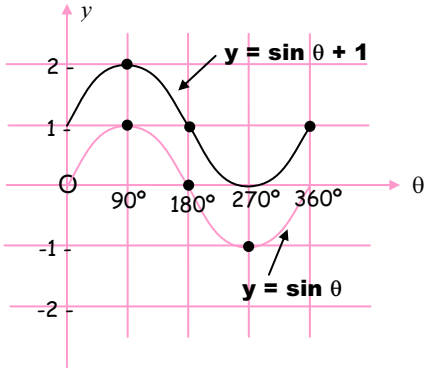
The SIN 'WHEEL':



A.



B.



2. The comparison

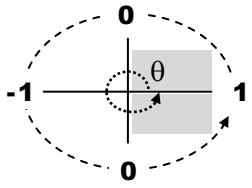
	y = 2 sin θ	y = sin θ	y = sin θ + 1
Amplitude	2 units	1 unit	1 unit
Range	$-2 \le y \le 2$	$-1 \le y \le 1$	$0 \le y \le 2$
Period	360°	360°	360°

Remember to indicate turning points

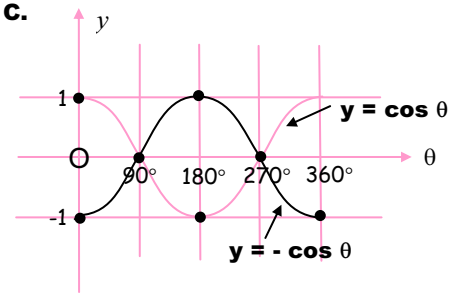
C & D: 1. The table of values and the sketches

	0°	90°	180°	270°	360°
(y =) cos θ	1	0	-1	0	1
(y =) - cos θ	-1	0	1	0	-1
(y =) cos θ - 1	0	-1	-2	-1	0

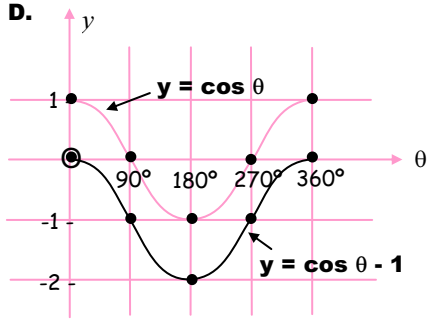
The COS 'WHEEL':



C.



D.

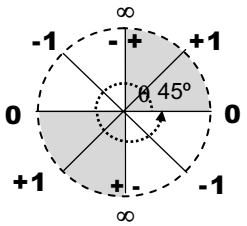


2. The comparison

	y = - cos θ	y = cos θ	y = cos θ - 1
Amplitude	1 unit	1 unit	1 unit
Range	$-1 \le y \le 1$	$-1 \le y \le 1$	$-2 \le y \le 0$
Period	360°	360°	360°

E & F

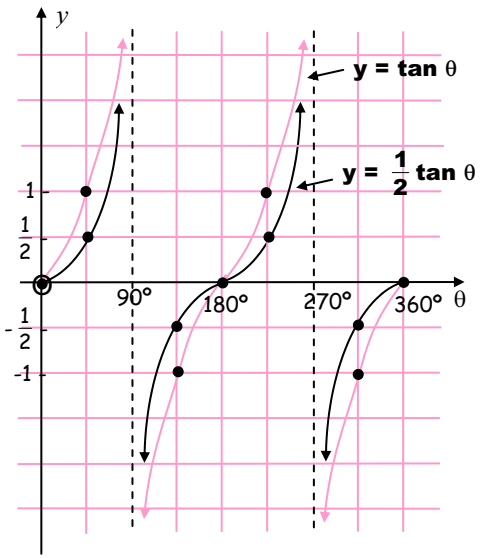
The TAN 'WHEEL':



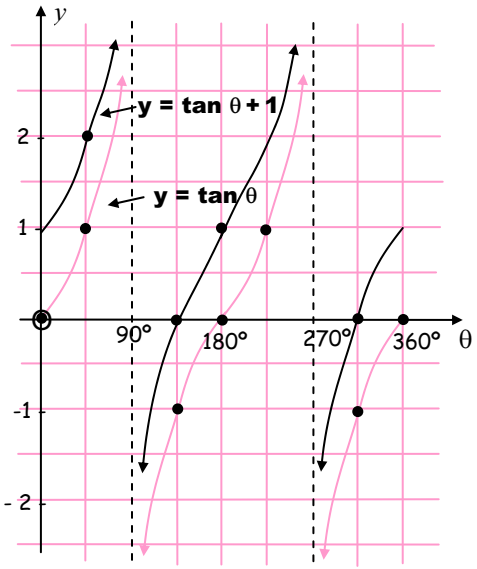
1. The table of values and the sketches

	0°	45°	90°	135°	180°	225°	270°	315°	360°
(y =) tan θ	0	1	± ∞	-1	0	1	± ∞	-1	0
(y =) $\frac{1}{2}$ tan θ	0	$\frac{1}{2}$	± ∞	$-\frac{1}{2}$	0	$\frac{1}{2}$	± ∞	$-\frac{1}{2}$	0
(y =) tan θ + 1	1	2	± ∞	0	1	2	± ∞	0	1

E.



F.



2. The comparison

	$y = \frac{1}{2}\tan\theta$	$y = \tan\theta$	$y = \tan\theta + 1$
Amplitude	—	—	—
Range	$y \in \mathbb{R}$	$y \in \mathbb{R}$	$y \in \mathbb{R}$
Period	180°	180°	180°

NOTES