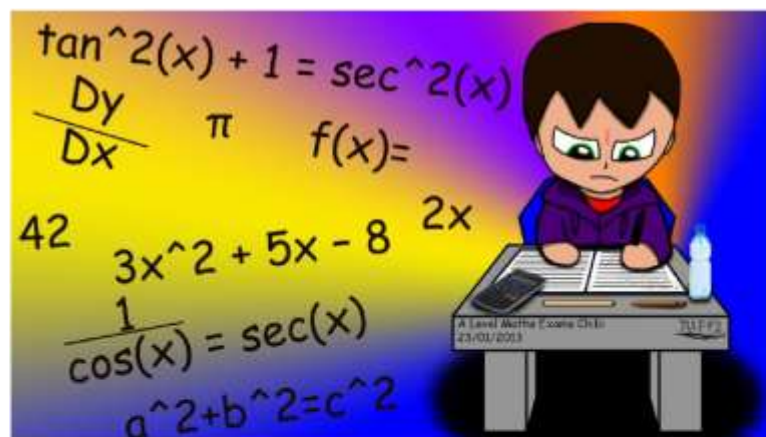


Huish Sixth  
MATHS Department



Introduction to A-Level Maths

ANSWER BOOKLET PART 2

# Sketching cubic and reciprocal graphs

## Answers

1

a

i

-

C

i

i

-

E

i

i

i

-

B

i

v

-

A

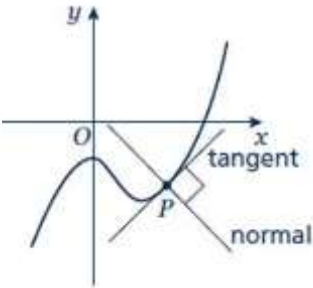
v

-

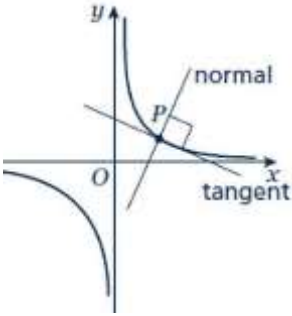
F

vi - D

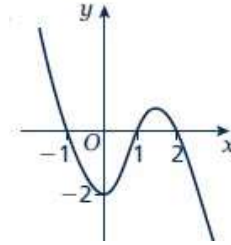
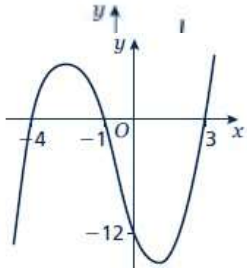
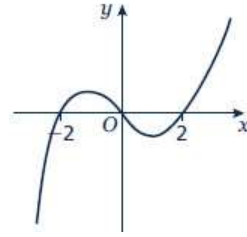
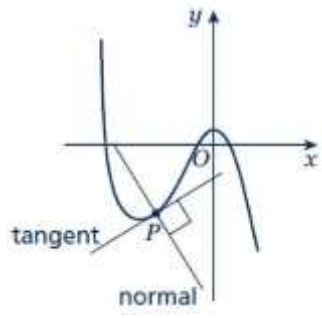
b ii



iv



vi



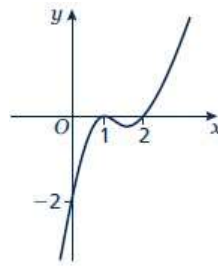
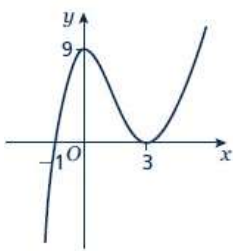
2

3

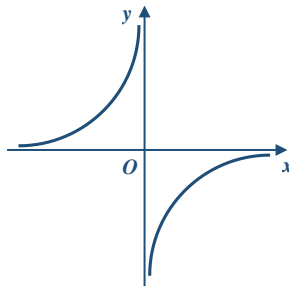
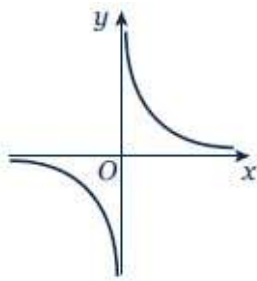
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5

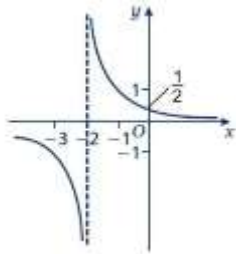
6 7



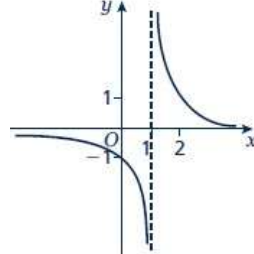
8 9



10



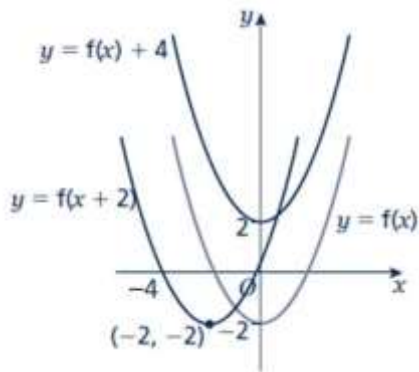
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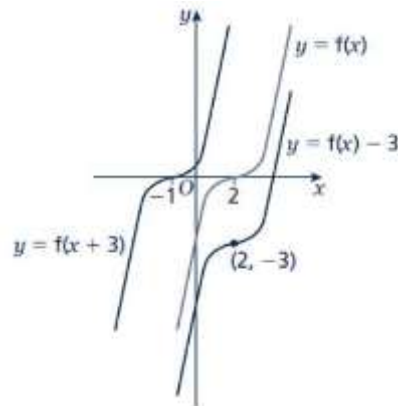
## Translating graphs

### Answers

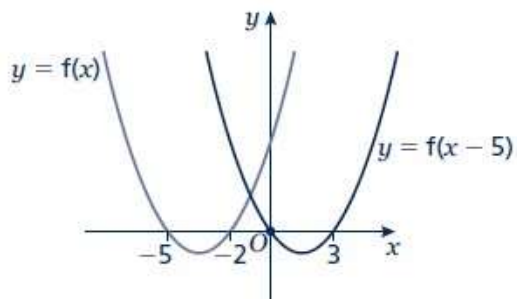
1



2



3



4

$$C_1: y = f(x - 90^\circ)$$

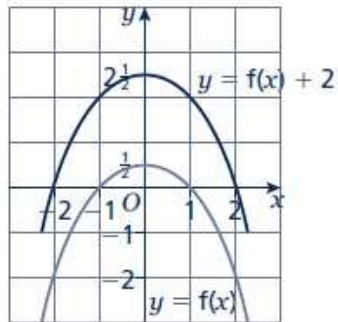
$$C_2: y = f(x) - 2$$

5

$C_2: y = f(x) - 3$

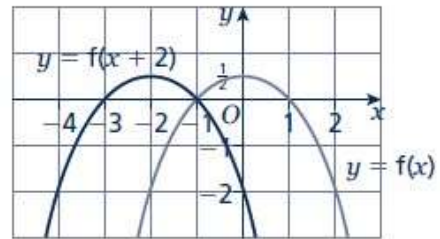
$C_1: y = f(x - 5)$

6

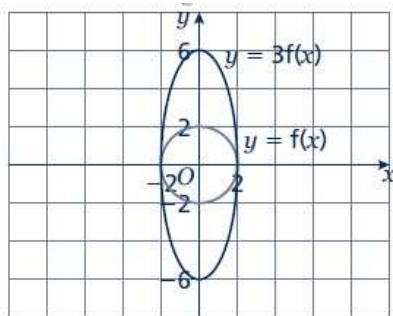


a

b

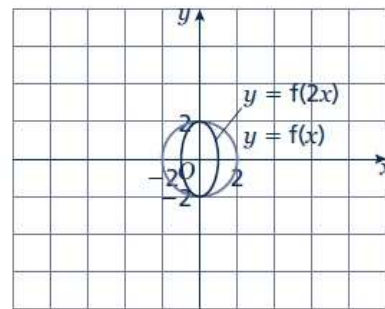


7

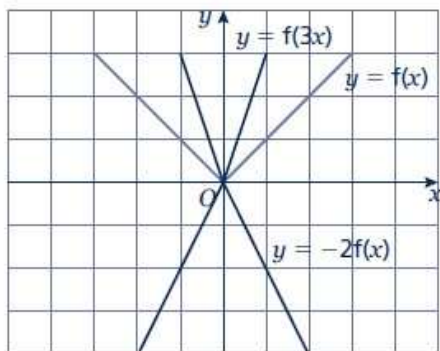


a

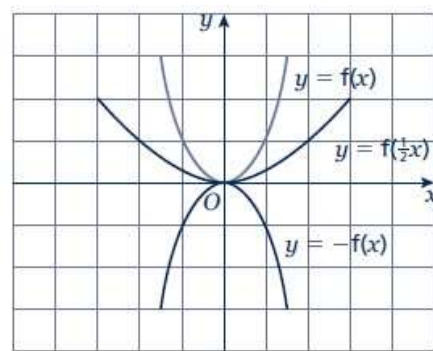
b



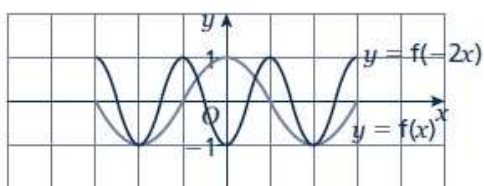
8



9



10

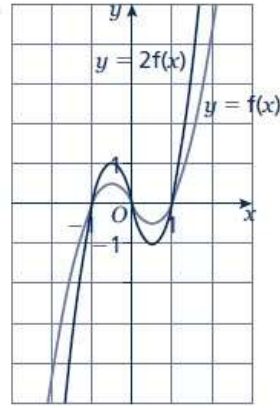
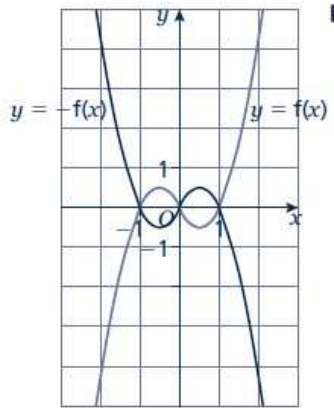


11  $y = f(2x)$

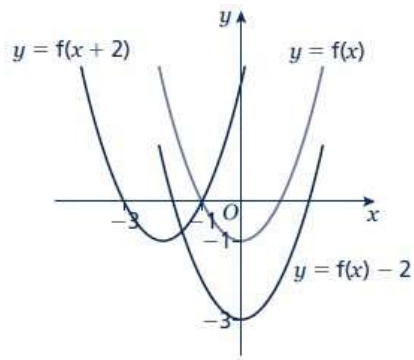
12  $y = -2f(2x)$  or  $y = 2f(-2x)$

13 a

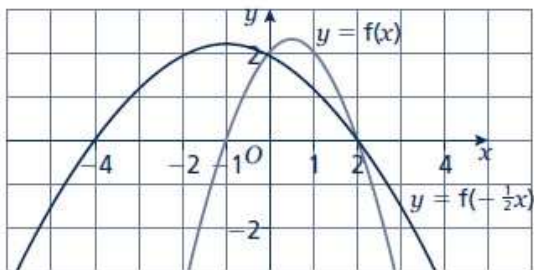
b



14



15



## Straight line graphs

### Answers

- 1    **a**     $m = 3, c = 5$     **b**     $m = -\frac{1}{2}, c = -7$   
**c**     $m = 2, c = -\frac{3}{2}$     **d**     $m = -1, c = 5$     **e**     $m = \frac{2}{3},$   
 $c = -\frac{7}{3}$  or  $-\frac{1}{3}$     **f**     $m = -5, c = 4$

2

Gradient	y-intercept	Equation of the line
5	0	$y = 5x$
-3	2	$y = -3x + 2$
4	-7	$y = 4x - 7$

- 3    **a**  $x + 2y + 14 = 0$     **b**     $2x - y = 0$   
**c**     $2x - 3y + 12 = 0$     **d**     $6x + 5y + 10 = 0$

4     $y = 4x - 3$

5     $y = -\frac{2}{3}x + 7$

- 6    **a**  $y = 2x - 3$     **b**     $y = -\frac{1}{2}x + 6$   
**c**     $y = 5x - 2$     **d**     $y = -3x + 19$

7     $y = -\frac{3}{2}x + 3$ , the gradient is  $-\frac{3}{2}$  and the y-intercept is 3.

The line intercepts the axes at (0, 3) and (2, 0). Students may sketch the line or give coordinates that lie on the line such as (1, -3/2) or (4, -3).

□

## Parallel and perpendicular lines

## Answers

- 1 a  $y = 3x - 7$     b  $y = -2x + 5$     c  $y = -\frac{1}{2}x$     d  $y = \frac{3}{2}x + 8$
- 2  $y = -2x - 7$
- 3 a  $y = -\frac{1}{2}x + 2$     b  $y = 3x + 7$     c  $y = -4x + 35$     d  $y = \frac{5}{2}x - 8$
- 4 a  $y = -\frac{1}{2}x$     b  $y = 2x$
- 5 a Parallel    b Neither    c Perpendicular
- d Perpendicular    e Neither    f Parallel
- 6 a  $x + 2y - 4 = 0$     b  $x + 2y + 2 = 0$     c  $y = 2x$

## Pythagoras' theorem

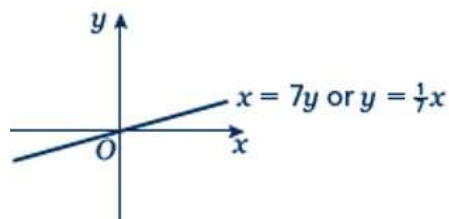
### Answers

- 1 a 10.3 cm    b 7.07 cm
- c 58.6 mm    d 8.94 cm
- 2 a  $4\sqrt{3}$  cm    b 2.21 cm    c  $\sqrt{8}$  mm    d 18.5 mm
- 3 a  $18\sqrt{3}$  mm    b  $2145\sqrt{3}$  mm    c 42.2 mm    d 6.89 mm
- 4  $95.3\sqrt{3}$  mm     $\sqrt{\quad}$
- 5  $64.0\sqrt{3}$  km     $\sqrt{\quad}$
- 6  $3\sqrt{5}$  units
- 7  $4\sqrt{3}$  cm

## Proportion

### Answers

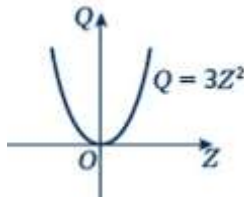
- 1 £77
- 2 a  $x = 7y$     b



- c 91    d 9

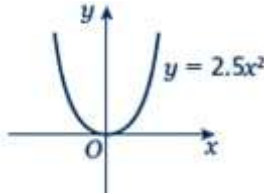


3 a  $Q = 3Z^2$  b



c 75 d  $\pm 10$

4 a  $y = 2.5x^2$  b



c  $\pm 6$

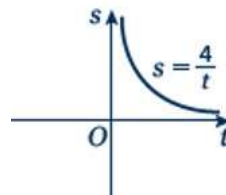
5 a 16 b 100

6 300

7 11.1

8 5

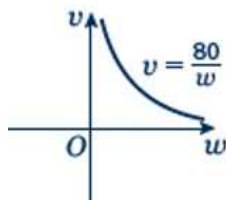
9 a  $s = \frac{4}{t}$  b



c 4

10 a 2 b 10

11 a  $v = \frac{80}{w}$  b  
c 40



12 6

13 a 24 b 4

14 1

15 1

16 a 0.1

b 0.1

### Circle theorems

### Answers

1 a  $a = 112^\circ$ , angle OAP = angle OBP =  $90^\circ$  and angles in a quadrilateral total  $360^\circ$ . b  $b = 66^\circ$ , triangle OAB is isosceles, Angle OAP =  $90^\circ$  as AP is tangent to the circle.

c  $c = 126^\circ$ , triangle OAB is isosceles.  $d = 63^\circ$ , Angle OBP =  $90^\circ$  as BP is tangent to the circle.

d  $e = 44^\circ$ , the triangle is isosceles, so angles  $e$  and angle OBA are equal. The angle OBP =  $90^\circ$  as BP is tangent to the circle.

$f = 92^\circ$ , the triangle is isosceles.

e  $g = 62^\circ$ , triangle ABP is isosceles as AP and BP are both tangents to the circle.  $h = 28^\circ$ , the angle OBP =  $90^\circ$ .

2 a  $a = 130^\circ$ , angles in a full turn total  $360^\circ$ .

$b = 65^\circ$ , the angle at the centre of a circle is twice the angle at the circumference.  $c = 115^\circ$ , opposite angles in a cyclic quadrilateral total  $180^\circ$ .

b  $d = 36^\circ$ , isosceles triangle.

$e = 108^\circ$ , angles in a triangle total  $180^\circ$ .  $f = 54^\circ$ , angle in a semicircle is  $90^\circ$ .

c  $g = 127^\circ$ , angles at a full turn total  $360^\circ$ , the angle at the centre of a circle is twice the angle at the circumference. d  $h = 36^\circ$ , the angle at the centre of a circle is twice the angle at the circumference.

3 a  $a = 25^\circ$ , angles in the same segment are equal.  $b = 45^\circ$ , angles in the same segment are equal.

b  $c = 44^\circ$ , angles in the same segment are equal.  $d = 46^\circ$ , the angle in a semicircle is  $90^\circ$  and the angles in a triangle total  $180^\circ$ .

c  $e = 48^\circ$ , the angle at the centre of a circle is twice the angle at the circumference.  $f = 48^\circ$ , angles in the same segment are equal.

d  $g = 100^\circ$ , angles at a full turn total  $360^\circ$ , the angle at the centre of a circle is twice the angle at the circumference.  $h = 100^\circ$ , angles in the same segment are equal.

4 a  $a = 75^\circ$ , opposite angles in a cyclic quadrilateral total  $180^\circ$ .

$b = 105^\circ$ , angles on a straight line total  $180^\circ$ .  $c = 94^\circ$ , opposite angles in a cyclic quadrilateral total  $180^\circ$ .

b  $d = 92^\circ$ , opposite angles in a cyclic quadrilateral total  $180^\circ$ .  $e = 88^\circ$ , angles on a straight line total  $180^\circ$ .  $f = 92^\circ$ , angles in the same segment are equal.

c  $h = 80^\circ$ , alternate segment theorem. d  $g = 35^\circ$ , alternate segment theorem and the angle in a semicircle is  $90^\circ$ .

5 Angle BAT =  $x$ .

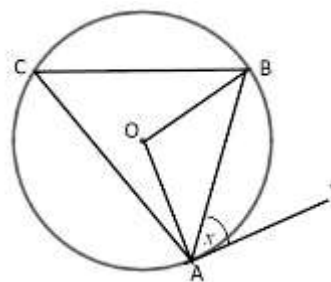
Angle OAB =  $90^\circ - x$  because the angle between the tangent and the radius is  $90^\circ$ .

OA = OB because radii are equal.

Angle OAB = angle OBA because the base of isosceles triangles are equal.

Angle AOB =  $180^\circ - (90^\circ - x) - (90^\circ - x) = 2x$  because angles in a triangle total  $180^\circ$ .

Angle ACB =  $2x \div 2 = x$  because the angle at the centre is twice the angle at the circumference.



## Trigonometry

## Answers

1 a 6.49 cm b 6.93 cm c 2.80 cm d 74.3 mm e 7.39 cm f 6.07 cm

2 a  $36.9^\circ$  b  $57.1^\circ$  c  $47.0^\circ$  d  $38.7^\circ$

3 5.71 cm

4 20.4°

5 a 45° b 1 cm c 30° d 3 cm  $\sqrt{\quad}$

6 a 6.46 cm b 9.26 cm c 70.8 mm d 9.70 cm

7 a 22.2° b 52.9° c 122.9° d 93.6°

8 a 13.7 cm b 76.0°

9 a 4.33 cm b 15.0 cm c 45.2 mm d 6.39 cm

10 a 42.8° b 52.8° c 53.6° d 28.2°

11 a 8.13 cm b 32.3°

12 a 18.1 cm<sup>2</sup> b 18.7 cm<sup>2</sup> c 693 mm<sup>2</sup>

13 5.10 cm

14 a 6.29 cm b 84.3° c 5.73 cm d 58.8°

15 15.3 cm

### Rearranging equations

4  $t = \frac{r}{q}$  5 p

### Answers

7  $y = 2 + \frac{1}{x}$  8

1  $d = \frac{C}{\square}$  2

10  $g = \frac{29h^+}{\square}$  11

7-h

13 a  $r = \sqrt{\frac{A}{b}}$

c  $r = \frac{P}{\square + 2}$

14 a  $x = \frac{abz}{\square}$  b  $cdy$

15  $\sin B = \frac{b \sin A}{a}$

16  $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$

17 a  $x = \frac{q^2 + pt}{\square}$  b  $q - ps$

3  $T = \frac{S}{D}$

$w = \frac{P}{2} - 2l$

6  $x = \frac{V}{a + 4}$

9  $d = \frac{3lx}{x+2} + \frac{-cb}{4y}$

12  $e = \frac{1}{x+7}$

$r = \sqrt[3]{\frac{3V}{4\square}}$

$V = \sqrt{\frac{3}{r}}$

$= 2\square h$

$d = \frac{3z}{x}$

$= \frac{4c}{p}$

$y^2$

$x = 3py + 2pqy = y(3p + 2q)$

**Volume and surface area of 3D shapes**

## Answers

- 1 a  $V = 396 \text{ cm}^3$  b  $V = 75\,000 \text{ cm}^3$   
c  $V = 402.5 \text{ cm}^3$  d  $V = 200\pi \text{ cm}^3$   
e  $V = 1008\pi \text{ cm}^3$  f  $V = \frac{1372}{3} \pi \text{ cm}^3$  g  $V = 121.5\pi \text{ cm}^3$  h  $V = 18\pi \text{ cm}^3$   
i  $V = 48\pi \text{ cm}^3$  j  $V = \frac{98}{3} \pi \text{ cm}^3$

2 17 cm

3 17 cm

4  $V = x^3 + \frac{17}{2}x^2 + 4x$

5  $60 \text{ cm}^3$

6 21.4 cm

7 32 : 9

8  $r = \sqrt[3]{36x}$

## Area under a graph

### Answers

- 1 34 units<sup>2</sup> 2 149 units<sup>2</sup>  
3 14 units<sup>2</sup> 4  $25\frac{1}{4}$  units<sup>2</sup>  
5 35 units<sup>2</sup> 6 42 units<sup>2</sup>  
7  $26\frac{7}{8}$  units<sup>2</sup> 8 56 units<sup>2</sup>  
9 35 units<sup>2</sup> 10  $6\frac{1}{4}$  units<sup>2</sup>