Edexcel IGCSE Higher Tier Mathematics Paper 4H – Jan 2016

1. (a) $\dfrac{\sqrt{4.6}}{8.1-3.7}=0.487445695$

   (b) 0.487 (3 sf)

2. $D=3\times(-5)^2+4\times(-5)=55$

3. Sum $=8\times4=32$
   Current sum $=3+1+5+5+2+3=19$
   Sum of two cards $=32-19=13$
   For range to be 9 largest $=1+9=10$
   Remaining numbers are 3 and 10

4. $\dfrac{2}{5}\times30=12$

5. $AEC=180-40-30=110°$ (angles in triangle add to 180°)
   $x=110°$ (corresponding angles)

6. Mid point $=\left(\dfrac{1+6}{2},\dfrac{4+9}{2}\right)=(3.5,6.5)$

7. (a) $0.88\times30=£26.40$

   (b) Let original price be x
   $0.12x=9$
   $x=\dfrac{9}{0.12}=£75$

8. (a) $1-0.2-.05-0.15=0.6$

   (b) $\dfrac{6}{n}=0.05$
   $n=\dfrac{6}{0.05}=120$

9. (a) $x(x+2)=x^2+2x$

(b) $4x-7>3$

$$4x>10$$

$$x>\frac{10}{4}$$

$$x>2.5$$

(c) $\frac{3-5m}{4}=8$

$$3-5m=32$$

$$3-32=5m$$

$$5m=-29$$

$$m=\frac{-29}{5}=-5.8$$

10. $\frac{24.5}{7}\times(2+6+7)=52.5\,\text{cm}$

11. $5x+y=17 \quad (1)$

$x+y=3 \quad (2)$

$4x=14 \quad (1)-(2)$

$x=\frac{14}{4}=3.5$

$3.5+y=3$ substitute into (2)

$y=3-3.5=-0.5$

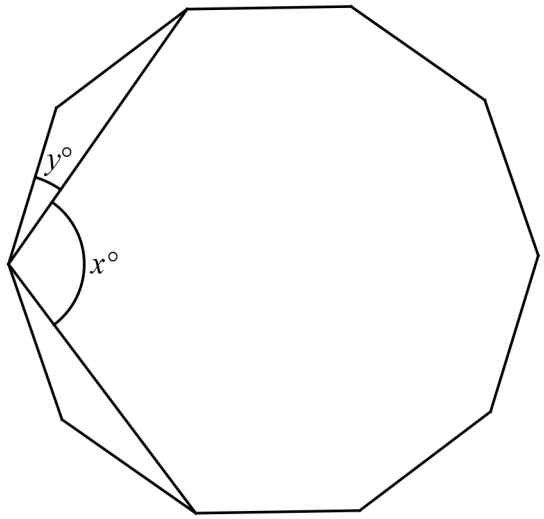
12. $y=c-2x$ if it is parallel to $y=4-2x$

$7=c-2\times3$

$c=7+6=13$

$y=13-2x$

13.



Interior angle in decagon $= \dfrac{180 \times (10-2)}{10} = 144$

$y = \dfrac{180-144}{2} = 18$ (angles in isosceles triangle)

$x = 144 - 2 \times 18 = 108$

14. (a) CDE and CBA are similar (in that order)

$\dfrac{CD}{5} = \dfrac{10}{4}$

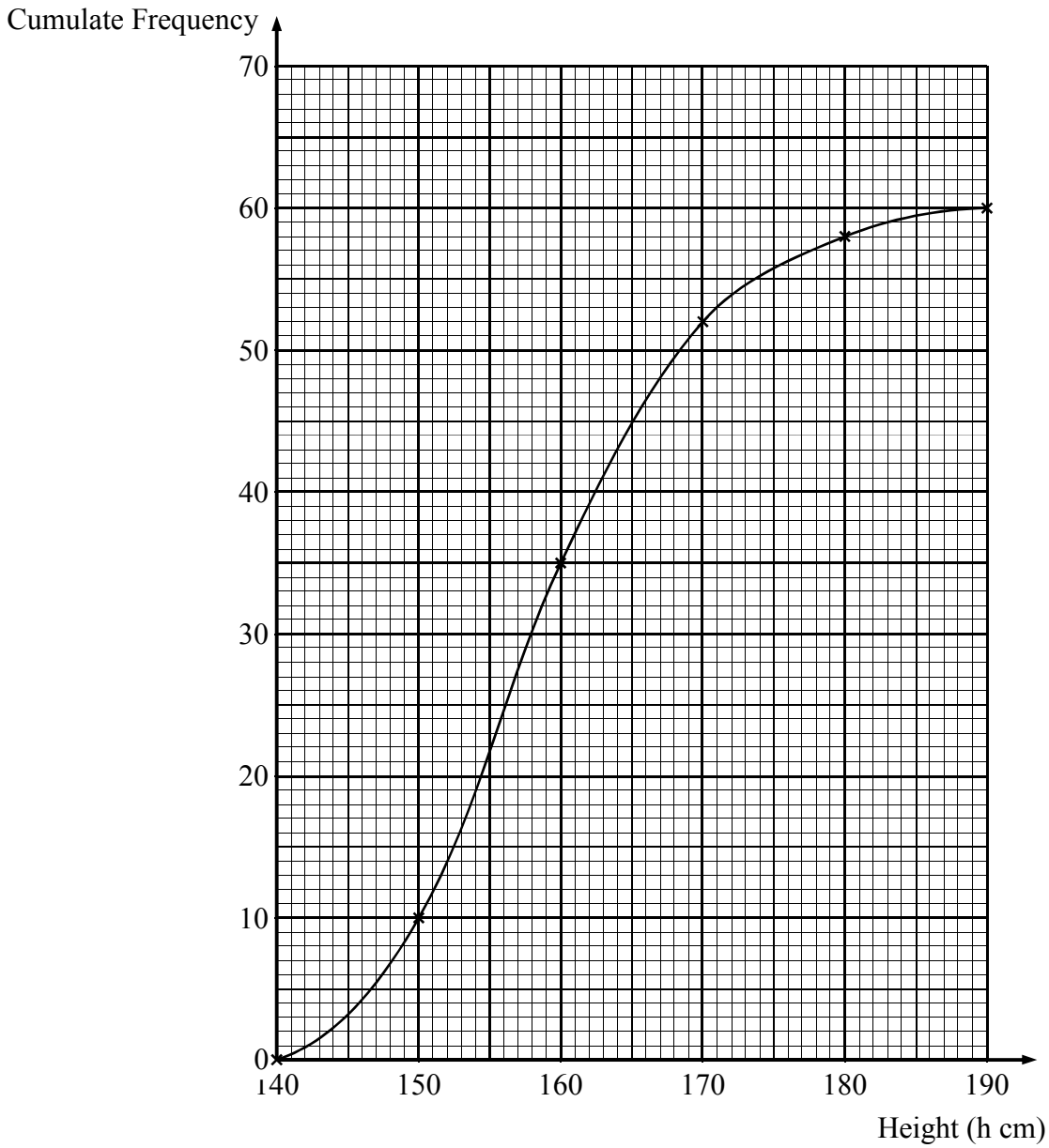
$CD = \dfrac{10}{4} \times 5 = 12.5$ cm

(b) $\dfrac{AB}{18} = \dfrac{4}{10}$

$CD = \dfrac{4}{10} \times 18 = 7.2$ cm

(c) Area $CDE = T \times \left(\dfrac{10}{4}\right)^2 = 6.25T$

15. (a)



(b) 158 cm

(c) $60 - 55 = 5$

16. (a) $\frac{dy}{dx} = 6x - 12$

(b) $6x - 12 = 18$

$6x = 30$

$x = 5$

$y = 3 \times 5^2 - 12 \times 5 + 8 = 23$

C is $(5, 23)$

17. (a) $\left(\dfrac{8e^6}{f^{12}}\right)^{\frac{1}{3}} = \dfrac{8^{\frac{1}{3}}(e^6)^{\frac{1}{3}}}{(f^{12})^{\frac{1}{3}}} = \dfrac{2e^2}{f^4}$

(b) $2y^2 - 72 = 2(y^2 - 36) = 2(y-6)(y+6)$

(c) $\dfrac{2p^2 - p - 15}{p^2 - 3p} = \dfrac{\cancel{(p-3)}(2p+5)}{p\cancel{(p-3)}} = \dfrac{2p+5}{p}$

18. (a)
$$y = k\sqrt{x}$$
$$4 = k\sqrt{49}$$
$$7k = 4$$
$$k = \frac{4}{7}$$
$$y = \frac{4}{7}\sqrt{x}$$

(b)
$$\frac{4}{7}\sqrt{x} = 12$$
$$\sqrt{x} = \frac{12 \times 7}{4} = 21$$
$$x = 21^2 = 441$$

19.
$$\frac{QS}{8.4} = \tan 38° \quad \text{(in triangle } QPS\text{)}$$
$$QS = 8.4 \tan 38°$$
$$\frac{QS}{QR} = \cos 44° \quad \text{(in triangle } QRS\text{)}$$
$$QR = \frac{QS}{\cos 44°}$$
$$= \frac{8.4 \tan 38°}{\cos 44°}$$
$$= 9.12 \text{ cm (3 sf)}$$

20. Let $AB = x$ cm
$$PB \times PA = PC \times PD \quad \text{(intersecting chords theorem)}$$
$$10(10 + x) = 15 \times 8$$
$$10 + x = \frac{15 \times 8}{10} = 12$$
$$x = 12 - 10 = 2$$
$$AB = 2 \text{ cm}$$

21. $$BC = \sqrt{4.8^2 + 6.4^2 - 2 \times 4.8 \times 6.4 \times \cos 123^\circ}$$
$$= \sqrt{97.46262231}$$
$$= 9.87 \text{ cm (3 sf)}$$

22.
$$\frac{6}{x-2} - \frac{6}{x+1} = 1$$
$$\frac{6(x+1) - 6(x-2)}{(x-2)(x+1)} = 1$$
$$\frac{6x + 6 - 6x + 12}{x^2 - x - 2} = 1$$
$$6x + 6 - 6x + 12 = x^2 - x - 2$$
$$18 = x^2 - x - 2$$
$$x^2 - x - 20 = 0$$
$$(x-5)(x+4) = 0$$
$$x = -4 \text{ or } 5$$

23.
$$2\pi r^2 + 2\pi rh = 56\pi\sqrt{6}$$
$$2\pi(4\sqrt{3})^2 + 2\pi(4\sqrt{3})h = 56\pi\sqrt{6}$$
$$2(4\sqrt{3})^2 + 2(4\sqrt{3})h = 56\sqrt{6}$$
$$(4\sqrt{3})^2 + (4\sqrt{3})h = 28\sqrt{6}$$
$$48 + 4\sqrt{3}h = 28\sqrt{6}$$
$$12 + \sqrt{3}h = 7\sqrt{6}$$
$$\sqrt{3}h = 7\sqrt{6} - 12$$
$$h = \frac{7\sqrt{6} - 12}{\sqrt{3}}$$
$$= \frac{7\sqrt{6}}{\sqrt{3}} - \frac{12}{\sqrt{3}}$$
$$= 7\sqrt{\frac{6}{3}} - \frac{12\sqrt{3}}{(\sqrt{3})^2}$$
$$= 7\sqrt{2} - \frac{12\sqrt{3}}{3}$$
$$= 7\sqrt{2} - 4\sqrt{3}$$

24. $\frac{50}{360} \times \pi r^2 = 20\pi$

$$r^2 = \frac{20 \times 360}{50} = 144$$

$$r = \sqrt{144} = 12$$

$$\text{Perimeter} = 2 \times 12 + \frac{50}{360} \times 2 \times \pi \times 12$$

$$= 34.5 \text{ cm (3 sf)}$$

25. $\left(16 \times 10^{8k}\right)^{\frac{5}{4}} = 16^{\frac{5}{4}} \times \left(10^{8k}\right)^{\frac{5}{4}}$

$$= \left(\sqrt[4]{16}\right)^5 \times 10^{8k \times \frac{5}{4}}$$

$$= 32 \times 10^{10k}$$

$$= 3.2 \times 10^{10k+1}$$