This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners’ meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
1 (a) (i) value of time greater than or equal to 10 s;  
(allow: answers in minutes and seconds)  
(iii) value within 10% of first value;  
both values to nearest second;  

(b) (i) Fe$^{2+}$ value less than both values in (a);  
(ii) Fe$^{3+}$ value less than both values in (a), AND to nearest second;  
(iii) X$^{2+}$ value less than or equal to 5 s/X$^{2+}$ value is ‘instant’;  

(c) (i) at least four $\frac{1}{t}$ values calculated correctly (ignore s.f.);  
(if t = 0 allow $\frac{1}{t}$ to be left blank or infinity but do not allow zero)  
(ii) they are catalysts;  
$\frac{1}{t}$ (rate) increased (with addition of metal ion)/time decreased (with addition  
of metal ion);  

(d) reliable as within 10% (or other suitable percentage or comment)  
OR  
not reliable as greater than 10% difference (or other suitable percentage or  
comment);  
(answer must demonstrate an understanding of reliability)  
(ignore: references to accuracy)  

(e) (i) add 1 cm$^3$ water/ add 5 drops + 1 cm$^3$ starch;  
(do NOT allow: 0.5 cm$^3$ more of A and 0.5 cm$^3$ more of B)  
total volume should be same as in (b)/ equivalent volume to metal ion/to  
keep concentrations the same;  
(mark independently)  
(ii) ppt./white ppt./cream ppt./instant blue-black/instant reaction/more brown;  

(f) blue ppt./dark blue solution;  
X is copper/Cu (depends on blue in first marking point);  
(allow: Cu$^{2+}$ or copper(II) for second marking point)  

[Total: 15]
3  (a)  \( h \) AND \( D \) AND \( d \) recorded ;
\( h > D > d ; \)
all values to the nearest 0.1 cm ;
\( d_A \) calculation correct ;
\( V \) calculation correct ;
\( V \) given as whole number ;

[6]

(b)  (i)  \( V_w \) correctly calculated with working shown, e.g. subtraction of two values ;
\( V_w \) is supervisor’s value ± 20 cm\(^3\) (can get this accuracy mark without calculation) ;

[2]

(ii)  cup not completely full / measuring cylinder not read at eye level / measuring cylinder not read perpendicularly / measuring cylinder not read from bottom of meniscus / water spilled on transfer / \( R_2 \) off scale of measuring cylinder ;

[max 1]

(iii)  \( V_W \) since difficult to measure \( h / V_W \) since \( d \) (or \( D \)) not inside diameters / \( V_W \) since it is a direct measurement / \( V_W \) since \( V \) is an approximation / \( V_W \) is actual measurement whereas \( V \) uses a formula ;

[max 1]

(c)  (i)  evidence of at least 2 loops of string around cup ;
(this could be in words or from diagram and could be in different positions or one position repeated)
correct averaging of two or more measurements for value of \( C \) ;
answer to 0.1 cm (independent mark) ;

[3]

(ii)  diagram showing correct positioning of one loop, e.g. half way up / at top / at bottom ;

[1]

(iii)  calculation correct to 2 or 3 s.f. ;

[1]

[Total: 15]