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/ /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ JHQHUDO DFDGHPLF DQ
SKUDVHV VXIILFLHQWO\ JRZULWLQJ VSHDNLQJ DQG OLVW
FDUHHU UHDGLQHVV VWDQGDUGV LQGLFDWHG LQ HDFK GUDQFH Y RF DEXOD
NQRZOHGJH ZKHQ FRQVLGHULQJ D ZRUG RU SKUDVH LP
H[SUHVVLRQ

567 5HDGLQJ 6FLHQFH 7HFKQLFDO

'HWHUPLQH WKH PHDQLQJ RI V\PEROV NH\ WHUPV DQG
DQG SKUDVHV DV WKH\ DUH XVHG LQ D VSHFLILF VFLHQ
WR JUDGHV ± WH[WV DQG WRSLFV

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$6 5 5HDGLQJ

5HDG FORVHO\ WR GHWHUPLQH ZKDW WKH WH[W VD\V H
LQIHUHQFHV IURP LW FLWH VSHFLILF WH[WXDO HYLGHQ
VXSSRUW FRQFOXVLRQV GUDZQ IURP WKH WH[W

$6 5 5HDGLQJ

,QWHUSUHW ZRUGV DQG SKUDVHV DV WKH\ DUH XVHG L
WHFKQLFDO FRQQRWDWLYH DQG ILJXUDWLYH PHDQLQ
FKRLFHV VKDSH PHDQLQJ RU WRQH

$6 5 5HDGLQJ

,QWHJUDWH DQG HYDOXDWH FRQWHQW SUHVHQWHG LQ
YLVXDOO\ DQG TXDQWLWDWLYHO\ DV ZHOO DV LQ ZRU

$6 5 5HDGLQJ

5HDG DQG FRPSUHKHQG FRPSOH[OLWHUDU\ DQG LQIRU
DQG SURILFLHQWO\

$6 : :ULWLQJ

:ULWH LQIRUPDWLYH H[SODQDWRU\ WH[WV WR H[DPLQH
LQIRUPDWLRQ FOHDUO\ DQG DFFXUDWHO\ WKURXJK WKH
DQG DQDO\VLV RI FRQWHQW

$6 : :ULWLQJ

3URGXFH FOHDU DQG FRKHUHQW ZULWLQJ LQ ZKLFK WK
VW\OH DUH DSSURSULDWH WR WDVN SXUSRVH DQG DX

$6 : :ULWLQJ

*DWKHU HYDQW LQIRUPDWLRQ IURP PXOWLSOH SULQW D
FUHGLELOLW\ DQG DQbÐQG Ñ`QJ p°€P0,“IO\ RQ FWL HFW

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: :U L W L Q J

3U R G X F H F O H D U D Q G F R K H U H Q W Z U L W L Q J L Q Z K L F K W K
V W \ O H D U H D S S U R S U L D W H W R W D V N S X U S R V H D Q G D X

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: : U L W L Q J

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$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

,QWHJUDWH DQG HYDOXDWH LQIRUPDWLRQ SUHVHQWHG LQFOXGLQJ YLVXDOO\ TXDQWLWDWLYHO\ DQG RUDOO\

$6 / /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ D UDQJH RI JHQHUDO D ZRUGV DQG SKUDVHV VXIILFLHQW IRU UHDGLQJ ZULWL FROOHJH DQG FDUHHU UH@00`ÀIL 0@m0P@\ D0

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$6 : :ULWLQJ

*DWKHU UHOHYDQW LQIRUPDWLRQ IURP PXOWLSOH SUL
FUHGLELOLW\ DQG DFFXUDF\ RI HDFK VRXUFH DQG LQW
DYRLGLQJ SODJLDULVP

$6 : :ULWLQJ

'UDZ HYLGHQFH IURP FLWHUDU\ RU LQIRUPDWLRQDO WH[WV WR
DQG UHVHDUFK

$6 : :ULWLQJ

:ULWH URXWLQHO\ RYHU H[WHQGHG WLPH IUDPHV WLPH
UHYLVLRQ DQG VKRUWHU WLPH IUDPHV D VLQJOH VLW
WDVNV SXUSRVHV DQG DXGLHQFHV

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHSDUH IRU DQG SDUWLFLSDWH HIIHFWLYHO\ LQ D UD
FROODERUDWLRQV ZLWK GLYHUVH SDUWQHUV EXLOGLQ
WKHLU RZQ FOHDUO\ DQG SHUVXDVLYHO\

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

,QWHJUDWH DQG HYDOXDWH LQIRUPDWLRQ SUHVHQWHG
LQFOXGLQJ YLVXDOO\ TXDQWLWDWLYHO\ DQG RUDOO\

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHVHQW LQIRUPDWLRQ ILQGLQJV DQG VXSSRUWLQJ H
IROORZ WKH OLQH RI UHDVRQLQJ DQG WKH RUJDQL]DWL
DSSURSULDWH WR WDVN SXUSRVH DQG DXGLHQFH

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

0DNH VWUDWHJLF XVH RI GLJLWDO PHGLD DQG YLVXDO
LQIRUPDWLRQ DQG HQKDQFH XQGHUVWDQGLQJ RI SUHV

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

$GDSW VSHHFK WR D YDULHW\ RI FRQWH[WV DQG FRPPX
FRPPDQG RI IORUDO (QJOLVK ZKHQ LQGLFDWHG RU DSS

$6 / /DQJXDJH

'HPRQVWUDWH FRPPDQG RI WKH FRQYHQWLRQV RI VWD
XVDJH ZKHQ ZULWLQJ RU VSHDNLQJ

$6 / /DQJXDJH

'HPRQVWUDWH FRPPDQG RI WKH FRQYHQWLRQV RI VWD
SXQFWXDWLRQ DQG VSHOOLQJ ZKHQ ZULWLQJ

$6 / /DQJXDJH

'HWHUPLQH RU FODULI\ WKH PHDQLQJ RI XQNQRZQ DQG
SKUDVHV E\ XVLQJ FRQWH[W FOXHV DQDO\]LQJ PHDQLQ
JHQHUDO DQG VSHFLDOL]HG UHIHUHQFH PDWHULDOV D

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$6 / /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ D UDQJH RI JHQHUDO D
ZRUGV DQG SKUDVHV VXIILFLHQW IRU UHDGLQJ ZULWL
FROOHJH DQG FDUHHU UHDGLQHVV OHYHO GHPRQVWUD
YRFDEXODU\ NQRZOHGJH ZKHQ FRQVLGHULQJ D ZRUG R
FRPSUHKHQVLRQ RU H[SUHVVLRQ

/ /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ JHQHUDO DFDGHPLF DQ
SKUDVHV VXIILFLHQW IRU UHDGLQJ ZULWLQJ VSHDNL
FDUHHU UHDGLQHVV OHYHO GHPRQVWUDWH LQGHSHQG
NQRZOHGJH ZKHQ FRQVLGHULQJ D ZRUG RU SKUDVH LP
H[SUHVVLRQ

567 5HDGLQJ 6FLHQFH 7HFKQLFDO

'HWHUPLQH WKH PHDQLQJ RI V\PEROV NH\ WHUPV DQG
DQG SKUDVHV DV WKH\ DUH XVHG LQ D VSHFLILF VFLHQ
WR JUDGHV ± WH[WV DQG WRSLFV

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$6 : :ULWLQJ

'UDZ HYLGHQFH IURP OLWHUDU\ RU LQIRUPDWLRQDO WH
DQG UHVHDUFK

$6 : :ULWLQJ

:ULWH URXWLQHO\ RYHU H[WHQGHG WLPH IUDPHV WLPH
UHYLVLRQ DQG VKRUWHU WLPH IUDPHV D VLQJOH VLW
WDVNV SXUSRVHV DQG DXGLHQFHV

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHSDUH IRU DQG SDUWLFLSDWH HIIHFWLYHO\ LQ D UD
FROODERUDWLRQV ZLWK GLYHUVH SDUWQHUV EXLOGLQ
WKHLU RZQ FOHDUO\ DQG SHUVXDVLYHO\

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

,QWHJUDWH DQG HYDOXDWH LQIRUPDWLRQ SUHVHQWHG
LQFOXGLQJ YL`ð€@`UpÀ€0LhV b pÀ HD P `

$6 6/WH

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: :ULWLQJ

:ULWH LQIRUPDWLYH H[SODQDWRU\ WH[WV WR H[DPLQH FRQFHSWV DQG LQIRUPDWLRQ FOHDUO\ DQG DFFXUDWH RUJDQL]DWLRQ DQG DQDO\VLV RI FRQWHQW

: G :ULWLQJ

8VH SUHFLVH ODQJXDJH DQG GRPDLQ VSHFLILF YRFDEX RI WKH WRSLF

: :ULWLQJ

3URGXFH FOHDU DQG FRKHUHQW ZULWLQJ LQ ZKLFK WK VW\OH DUH DSSURSULDWH WR WDVN SXUSRVH DQG DX IRU ZULWLQJ W\SHV DUH GHILQHG LQ VWDQGDUGV ± D

6/ E 6SHDNLQJ DQG /LVWHQLQJ

:RUN ZLWK SHHUV WR VHW UXOHV IRU FROOHJLDO GLVF LQIRUPDO FRQYHUVDWLRQV WR GHILQH SXUSRVH DQG NH\ LVVXHV SUHVHQWDW FOHDU JRDOV DQG GHDGOLQHV DQG LQGLYLGXDO UROH

/ /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ JHQHUDO DFDGHPLF DQ SKUDVHV VXIILFLHQW IRU UHDGLQJ ZULWLQJ VSHDNL FDUHHU UHDGLQHVV OHYHO GHPRQVWUDWH LQGHSHQG NQRZOHGJH ZKHQ FRQVLGHULQJ D ZRUG RU SKUDVH LP H[SUHVVLRQ

567 5HDGLQJ 6FLHQFH 7HFKQLFDO

'HWHUPLQH WKH PHDQLQJ RI V\PEROV NH\ WHUPV DQG DQG SKUDVHV DV WKH\ DUH XVHG LQ D VSHFLILF VFLHQ WR JUDGHV ± WH[WV DQG WRSLFV

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$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHSDUH IRU DQG SDUWLFLSDWH HIIHFWLYHO\ LQ D UD
FROODERUDWLRQV ZLWK GLYHUVH SDUWQHUV EXLOGLQ
WKHLU RZQ FOHDUO\ DQG SHUVXDVLYHO\

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

,QWHJUDWH DQG HYDOXDWH LQIRUPDWLRQ SUHVHQWHG
LQFOXGLQJ YLVXDOO\ TXDQWLWDWLYHO\ DQG RUDOO\

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHVHQW LQIRUPDWLRQ ILQGLQJV DQG VXSSRUWLQJ H
IROORZ WKH OLQH RI UHDVRQLQJ DQG WKH RUJDQL]DWL
DSSURSULDWH WR WDVN SXUSRVH DQG DXGLHQFH

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

0DNH VWUDWHJLF XVH RI GLJLWDO PHGLD DQG YLVXDO
LQIRUPDWLRQ DQG HQKDQFH XQGHUVWDQGLQJ RI SUHV

$6 6/ 6SHDNLQJ DQG /LVWHQLQJ

$GDSW VSHHFK WR D YDULHW\ RI FRQWH[WV DQG FRPPX
FRPPDQG RI IRUPDO (QJOLVK ZKHQ LQGLFDWHG RU DSS

$6 / /DQJXDJH

'HPRQVWUDWH FRPPDQG RI WKH FRQYHQWLRQV RI VWDQ
XVDJH ZKHQ ZULWLQJ RU VSHDNLQJ

$6 / /DQJXDJH

'HPRQVWUDWH FRPPDQG RI WKH FRQYHQWLRQV RI VWDQ
SXQFWXDWLRQ DQG VSHOOLQJ ZKHQ ZULWLQJ

$6 / /DQJXDJH

$SSO\ NQRZOHGJH RI ODQJXDJH WR XQGHUVWDQG KRZ
FRQWH[WV WR PDNH HIIHFWLYH FKRLFHV IRU PHDQLQJ
IXOO\ ZKHQ UHDGLQJ RU OLVWHQLQJ

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$6 / /DQJXDJH

'HWHUPLQH RU FODULI\ WKH PHDQLQJ RI XQNQRZQ DQG SKUDVHV E\ XVLQJ FRQWH[W FOXHV DQDO\]LQJ PHDQLQJ JHQHUDO DQG VSHFLDOL]HGUSSLHRUSUQLDWHPHDWHULDOV D

$6 / /DQJXDJH

$FTXLUH DQG XVH DFFXUDWHO\ D UDQJH RI JHQHUDO D ZRUGV DQG SKUDVHV VXIILFLHQW IRU UHDGLQJ ZULWL FROOHJH DQG FDUHHU UHDGLQHVV OHYHO GHPRQVWUD YRFDEXODU\ NQRZOHGJH ZKHQ FRQVLGHULQJ D ZRUG R FRPSUHKHQVLRQ RU H[SUHVVLRQ

6/ 6SHDNLQJ DQG /LVWHQLQJ

3UHVHQW LQIRUPDWLRQ ILQGLQJV DQG VXSSRUWLQJ H ORJLFDOO\ VXFK WKDW OLVWHQHUV FDQ IROORZ WKH O GHYHORSPHQW VXEVWDQFH DQG VW\OH DUH DSSURSU WDVN

6/ 6SHDNLQJ DQG /LVWHQLQJ

0DNH VWUDWHJLF XVH RI GLJLWDO PHGLD H J WH[WX LQWHUDFWLYH HOHPHQWV LQ SUHVHQWDWLRQV WR HQ UHDVRQLQJ DQG HYLGHQFH DQG WR DGG LQWHUHVW

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Civil Engineering and Architecture (CEA)

Common Core State Standards for Mathematics

Lesson 2.2

1 4 4XDQWLWLHV

&KRRVH D OHYHO RI DFFXUDF\ DSSURSULDWH WR OLPLW UHSRUWLQJ TXDQWLWLHV

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ FRQFHSWV RI GHQVLW\ EDVHG RQ DUHD DQG YRO SHUVRQV SHU VTXDUH PLOH %78V SHU FXELF IRRW

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ JHRPHWULF PHWKRGV WR VROYH GHVLJQ SUREOH VWUXFWXUH WR VDWLVI\ SK\VLFDO FRQVWUDLQWV RU P W\SRJUDSKLF JULG V\VWHPV EDVHG RQ UDWLRV

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$ &(' &UHDWLQJ (TXDWLRQV

&UHDWH HTXDWLRQV DQG LQHTXDOLWLHV LQ RQH YDUL
,QFOXGH HTXDWLRQV DULVLQJ IURP OLQHDU DQG TXDG
UDWLRQDO DQG H[SRQHQWLDO IXQFWLRQV

$ &(' &UHDWLQJ (TXDWLRQV

&UHDWH HTXDWLRQV LQ WZR RU PRUH YDULDEOHV WR U
TXDQWLWLHV JUDSK HTXDWLRQV RQ FRRUGLQDWH D[HV

$ &(' &UHDWLQJ (TXDWLRQV

5HSUHVHQW FRQVWUDLQWV E\ HTXDWLRQV RU LQHTXDOLWLHV
DQG RU LQHTXDOLWLHV DQG LQWHUSUHW VROXWLRQV
PRGHOLQJ FRQWH[W)RU H[DPSOH UHSUHVHQW LQHTXDOLWLHV
FRVW FRQVWUDLQWV RQ FRPELQDWLRQV RI GLIIHUHQW

) ,) E ,QWHUSUHWLQJ)XQFWLRQV

*UDSK VTXDUH URRW FXEH URRW DQG SLHFHZLVH GHI
IXQFWLRQV DQG DEVROXWH YDOXH IXQFWLRQV

) %) %XLOGLQJ)XQFWLRQV

:ULWH DQG UHFRJQL]H DW GHVFULEHV D UHODWLRQVKLS EHWZH

) %) D %XLOGLQJ)XQFWLRQV

'HWHUPLQH DQ H[SOLFLW H[SUHVVLRQ D UHFXUVLYH SU
IURP D FRQWH[W

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ FRQFHSWV RI GHQVLW\ EDVHG RQ DUHD DQG YRO
SHUVRQV SHU VTXDUH PLOH %78V SHU FXELF IRRW

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ JHRPHWULF PHWKRGV WR VROYH GHVLJQ SUREOH
VWUXFWXUH WR VDWLVI\ SK\VLFDO FRQVWUDLQWV RU P
W\SRJUDSKLF JULG V\VWHPV EDVHG RQ UDWLRV

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Civil Engineering and Architecture (CEA)

Common Core State Standards for Mathematics

Lesson 3.1

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ JHRPHWULF PHWKRGV WR VROYH GHVLJQ SUREOH
VWUXFWXUH WR VDWLVI\ SK\VLFDO FRQVWUDLQWV RU P
W\SRJUDSKLF JULG V\VWHPV EDVHG RQ UDWLRV

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6ROYH V\VWHPV RI OLQHDU HTXDWLRQV H[DFWO\ DQG D
IRFXVLQJ RQ SDLUV RI OLQHDU HTXDWLRQV LQ WZR YDU

* 0* 0RGHOLQJ ZLWK *HRPHWU\

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Civil Engineering and Architecture (CEA)

Common Core State Standards for Mathematics

Lesson 3.3

1 4 4XDQWLWLHV

&KRRVH D OHYHO RI DFFXUDF\ DSSURSULDWH WR OLPLW UHSRUWLQJ TXDQWLWLHV

$ &(' &UHDWLQJ (TXDWLRQV

&UHDWH HTXDWLRQV DQG LQHTXDOLWLHV LQ RQH YDUL ,QFOXGH HTXDWLRQV DULVLQJ IURP OLQHDU DQG TXDG UDWLRQDO DQG H[SRQHQWLDO IXQFWLRQV

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Civil Engineering and Architecture (CEA)

Common Core State Standards for Mathematics

Lesson 4.1

* 0* 0RGHOLQJ ZLWK *HRPHWU\

$SSO\ JHRPHWULF PHWKRGV WR VROYH GHVLJQ SUREOH
VWUXFWXUH WR VDWLVI\ SK\VLFDO FRQVWUDLQWV RU P
W\SRJUDSKLF JULG V\VWHPV EDVHG RQ UDWLRV

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Civil Engineering and Architecture (CEA)

Next Generation Science Standards

Lesson 1.1

'&, (66 $ (DUWK DQG +XPDQ $FWLYLW\ 1DWXUDO 5HVRX
5HVRXUFH DYDLODELOLW\ KDV JXLGHG WKH GHYHORSPH
+6 (66

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 2EWDLQLQJ (YDOX
,QIRUPDWLRQ

&RPSDUH LQWHJUDWH DQG HYDOXDWH VRXUFHV RI LQI
PHGLD RU IRUPDWV H J YLVXDOO\ TXDQWLWDWLYHO\
DGGUHVV D VFLHQWLILF TXHVWLRQ RU VROYH D SUREO

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Civil Engineering and Architecture (CEA)

Next Generation Science Standards

Lesson 2.2

06 36 (QHUJ\

06 36 $SSO\ VFLHQWLILF SULQFLSOHV WR GHVLJQ F
WKDW HLWKHU UHGXFH RU HOLPLQDWH WKH HQHUJ\ WUDQVIHU

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

8VH PDWKHPDWLFDO FRPSXWDWLRQDO DQG RU DOJRU
SKHQRPHQD RU GHVLJQ VROXWLRQV WR GHVFULEH DQG
H[SODQDWLRQV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ WHFKQLTXHV RI DOJHEUD DQG IXQFWLRQV WR UH
HQJLQHHULQJ SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ UDWLRV UDWHV SHUFHQWDJHV DQG XQLW FRQ
FRPSOLFDWHG PHDVXUHPHQW SUREOHPV LQYROYLQJ TX
FRPSRXQG XQLWV VXFK DV PPPD X @V DFUJ IHH0ð0€

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH FRQVSULDWLQJ H[S

$SSO\ 6FLHQWLILF LGHDV SULQF[SOHV DQG U @•À0GH

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06 (76 (QJLQHHULQJ 'HVLJQ

'HILQH WKH FRQWH[W LQ LDQQG

'&, (76 % (QJLQHHULQJ 'HVLJQ 'HYHORSLQJ 3RVVLEOH

:KHQ HYDOXDWLQJ VROXWLRQV LW LV LPSRUWDQW WR FRQVWUDLQWV LQFOXGLQJ FRVW VDIHW\ UHOLDELOLW\ VRFLDO FXOWXUDO DQG HQYLURQPHQWDO LPSDFWV

'&, (76 & (QJLQHHULQJ 'HVLJQ 2SWLPL]LQJ WKH 'HVLJQ

&ULWHULD PD\ QHHG WR EH EURNHQ GRZQ LQWR VLPSOH V\VWHPDWLFDOO\ DQG GHFLVLRQV DERXW WKH SULRUL WUDGHRIIV PD\ EH QHHGHG VHFRQGDU\ WR +6 36

'&, /6 ' %LRORJLFDO (YROXWLRQ 8QLW\ DQG 'LYHUVLW\

+XPDQV GHSHQG RQ WKH OLYLQJ ZRUOG IRU WKH UHVR E\ ELRGLYHUVLW\ %XW KXPDQ DFWLYLW\ LV DOVR KDYI WKURXJK RYHUSRSXODWLRQ RYHUH[SORLWDWLRQ KD LQWURGXFWLRQ RI LQYDVLYH VSHFLHV DQG FOLPDWH VR WKDW HFRV\VWHP IXQFWLRQLQJ DQG SURGXFWLYLW VXSSRUWLQJ DQG HQKDQFLQJ OLIH RQ (DUWK 6XVWDLQ KXPDQLW\ E\ SUHVHUYLQJ ODQGVFDSHV RI UHFUHDWLR VHFRQGDU\\6 WR +16RWH 7KLV 'LVFLSOLQDU\ &RUH ,GHD +6 /6

'&, (66 $ (DUWK DQG +XPDQ $FWLYLW\ 1DWXUDO 5HVRX

$OO IRUPV RI HQHUJ\ SURGXFWLRQ DQG RWKHU UHVRXU HFRQRPLF VRFLDO HQYLURQPHQWDO DQG JHRSROLWL EHQHILWV 1HZ WHFKQRORJLHV DQG VRFLDO UHJXODWL IDFWRUV +6 (66

'&, (66 & (DUWK DQG +XPDQ $FWLYLW\ +XPDQ ,PSDFWV

7KH VXVWDLQDELOLW\ RI KXPDQ VRFLHWLHV DQG WKH E UHTXLUHV UHVSRQVLEOH PDQDJHPHQW RI QDWXUDO UH

'&, (66 & (DUWK DQG +XPDQ $FWLYLW\ +XPDQ ,PSDFWV

6FLHQWLVWV DQG HQJLQHHUV FDQ PDN€PP€PDQ <DQG 1

6FLHQ HV€D0•G (QJLQ HUFH $VNÀ\ `0TXHVWLRQV DQG @`•ÀQ

$VN P XHVWLR0P€

R WK@`0V V€D–WL 0`@P`•€ð0 P` `W•F pbQ RI SKFWH 00P€`G 6ODUL9\ DQG 0ÄE`HHN

G ` €0

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6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

(YDOXDWH PHULWV DQG OLPLWDWLRQV RI WZR GLIIHUH WRRO SURFHVV PHFKDQLVP RU V\VWHP LQ RUGHU WR ILWV WKH HYLGHQFH RU GHVLJQ FULWHULD

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

'HYHORS D FRPSOH[PRGHO WKDW DOORZV IRU PDQLSX SURFHVV RU V\VWHP

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

'HYHORS DQG RU XVH D PRGHO LQFOXGLQJ PDWKHPDW JHQHUDWH GDWD WR VXSSRUW H[SODQDWLRQV SUHGL DQG RU VROYH SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

8VH PDWKHPDWLFDO FRPSXWDWLRQDO DQG RU DOJRU SKHQRPHQD RU GHVLJQ VROXWLRQV WR GHVFULEH DQG H[SODQDWLRQV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ WHFKQLTXHV RI DOJHEUD DQG IXQFWLRQV WR UH HQJLQHHULQJ SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ UDWLRV UDWHV SHUFHQWDJHV DQG RU FRQ FRPSOLFDWHG PHDVXUHPHQW SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH &RQVWUXFWLQJ ([S

$SSO\ VFLHQWLILF LGHDV SULQFLSOHV DQG RU HYLGH SKHQRPHQD DQG VROYH GHVLJQ SUREOHPV WDNLQJ LQ XQDQWLFLSDWHG HIIHFWV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH &RQVWUXFWLQJ ([S

'HVLJQ HYDOXDWH DQG RU UHILQH D VROXWLRQ WR D RQ VFLHQWLILF NQRZOHGJH VWXGHQW JHQHUDWHG VR FULWHULD DQG WUDGHRII FRQVLGHUDWLRQV

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+6 (76 (QJLQHHULQJ 'HVLJQ

'HVLJQ D VROXWLRQ WR D FRPSOH[UHDO ZRUOG SUREO
VPDOOHU PRUH PDQDJHDEOH SUREOHPV WKDW FDQ EH

+6 (76 (QJLQHHULQJ 'HVLJQ

8VH D FRPSXWHU VLPXODWLRQ WR PRGHO WKH LPSDFW
FRPSOH[UHDO SUREOHP ZLWK QXPHURXV FULWHULD DQ
LQWHUDFWLRQV ZLWKLQ DQG EHWZHHQ V\VWHPV UHOHY

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

'HYHORS D FRPSOH[PRGHO WKDW DOORZV IRU PDQLSXO
SURFHVV RU V\VWHP

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

'HYHORS DQG RU XVH D PRGHO LQFOXGLQJ PDWKHPDW
JHQHUDWH GDWD WR VXSSRUW H[SODQDWLRQV SUHGLF
DQG RU VROYH SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

8VH PDWKHPDWLFDO FRPSXWDWLRQDO DQG RU DOJRU
SKHQRPHQD RU GHVLJQ VROXWLRQV WR GHVFULEH DQG
H[SODQDWLRQV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ WHFKQLTXHV RI DOJHEUD DQG IXQFWLRQV WR UH
HQJLQHHULQJ SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ UDWLRV UDWHV SHUFHQWDJHV DQG SURSRUWLRQV WR
FRPSOLFDWHG PHDVXUHPHQWV RI SURGXFWV SURFHVVHV
FRPSRXQG XQLWV PL[WXUHV DFUH IHHW HWF

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH &RQVWUXFWLQJ ([S

$SSO\ VFLHQWLILF LGHDV SULQFLSOHV DQG RU HYLGH
SKHQRPHQB÷¯• IHH UD (Q P0

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&U R V V F X W W L Q J &R Q F H S W V 6W U X F W X U H D Q G) X Q F W L R Q

7K H ZD\R EDQH F W LV VKDSHG RU VWUXFWXUHG GHWHUPLQ
I X QLFRWQ V

&U R V V F X W W L Q J &R Q F H S W V 6W U X F W X U H D Q G) X Q F W L R Q

,Q Y H V W L J D W L Q J RU G H V L J Q L Q J Q H Z V\V W H P V RU VWUX
H[D P L Q D W L R Q RI WKH SUR S H U W L H V RI G L I I H U H Q W PDW
F R P S R Q H Q W V DQG F R Q Q H F W L R Q V RI F R P S R Q H Q W V WR
S U R E O H P

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Civil Engineering and Architecture (CEA)

Next Generation Science Standards

Lesson 3.3

06 (66 (DUWK DQG +XPDQ $FWLYLW\

$SSO\ VFLHQWLILF SULQFLSOHV WR GHVLJQ D PHWKRG KXPDQ LPSDFW RQ WKH HQYLURQPHQW

+6 (66 (DUWK DQG +XPDQ $FWLYLW\

(YDOXDWH RU UHILQH D WHFKQRORJLFDO VROXWLRQ WK DFWLYLWLHV RQ QDWXUDO V\VWHPV

+6 (66 (DUWK DQG +XPDQ $FWLYLW\

8VH D FRPSXWDWLRQDO UHSUHVHQWDWLRQ WR LOOXVW V\VWHPV DQG KRZ WKRVH UHODWLRQVKLSV DUH EHLQJ

+6 (76 (QJLQHHULQJ 'HVLJQ

'HVLJQ D VROXWLRQ WR D FRPSOH[UHDO ZRUOG SUREO VPDOOHU PRUH PDQDJHDEOH SUREOHPV WKDW FDQ EH

'&, (76 $ (QJLQHHULQJ 'HVLJQ 'HILQLQJ DQG 'HOLPLWL

+XPDQLW\ IDFH PDMRU [illegible] W U

'OO ZDO@V

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06 (66 (DUWK DQG +XPDQ $FWLYLW\

$SSO\ VFLHQWLILF SULQFLSOHV WR GHVLJQ D PHWKRG KXPDQ LPSDFW RQ WKH HQYLURQPHQW

+6 (76 (QJLQHHULQJ 'HVLJQ

'HVLJQ D VROXWLRQ WR D FRPSOH[UHDO ZRUOG SUREO VPDOOHU PRUH PDQDJHDEOH SUREOHPV WKDW FDQ EH

+6 (76 (QJLQHHULQJ 'HVLJQ

8VH D FRPSXWHU VLPXODWLRQ WR PRGHO WKH LPSDFW FRPSOH[UHDO ZRUOG SUREOHP ZLWK QXPHURXV FULWH LQWHUDFWLRQV ZLWKLQ DQG EHWZHHQ V\VWHPV UHOHY

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 'HYHORSLQJ DQG 8

'HYHORS DQG RU XVH D PRGHO LQFOXGLQJ PDWKHPDW JHQHUDWH GDWD WR VXSSRUW H[SODQDWLRQV SUHGLF DQG RU VROYH SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH $QDO\]LQJ DQG ,QW

$QDO\]H GDWD XVLQJ WRROV WHFKQRORJLHV DQG RU PDWKHPDWLFDO LQ RUGHU WR PDNH YDOLG DQG UHOL DQ RSWLPDO GHVLJQ VROXWLRQ

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH $QDO\]LQJ DQG ,QW

$QDO\]H GDWD WR LGHQWLI\ GHVLJQ IHDWXUHV RU FKD SURSRVHG SURFHVV RU V\VWHP WR RSWLPL]H LW UHOD

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

8VH PDWKHPDWLFDO FRPSXWDWLRQDO DQG RU DOJRU SKHQRPHQD RU GHVLJQ VROXWLRQV WR GHVFULEH DQG H[SODQDWLRQV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ WHFKQLTXHV RI DOJHEUD DQG IXQFWLRQV WR UH HQJLQHHULQJ SUREOHPV

6FLHQFH DQG (QJLQHHULQJ 3UDFWLFH 8VLQJ 0DWKHPDWL

$SSO\ UDWLRV UDWHV SHUFHQWV 0DWKHPDWLFDO FRQFHSWV FRPSOLFDWHG PHDVXUHPHQWV WR GHVFULEH DQG FRPSRXQG XQLWV

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&RUVVFXWWLQJ &RQFHSWV 6WUXFWXUH DQG)XQFWLRQ

7KH ZD\ DQ REMHFW LV VKDSHG RU VWUXFWXUHG GHWH
IXQFWLRQV

&RUVVFXWWLQJ &RQFHSWV 6WUXFWXUH DQG)XQFWLRQ

,QYHVWLJDWLQJ RU GHVLJQLQJ QHZ V\VWHPV RU VWUXF
H[DPLQDWLRQ RI WKH SURSHUWLHV RI GLIIHUHQW PDWH
FRPSRQHQWV DQG FRQQHFWLRQV RI FRPSRQHQWV WR
SUREOHP

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06 (76 (QJLQHHULQJ 'HVLJQ

'HILQH WKH FULWHULD DQG FRQVWUDLQWV RI D GHVLJQ SUREOHP ZLWK VXIILF
WR HQVXUH D VXFFHVVIXO VROXWLRQ WDNLQJ LQWR D
DQG SRWHQWLDO LPSDFWV DQG WKH QDWXUDO HQYLURQP
SRVVLEOH VROXWLRQV

06 (76 (QJLQHHULQJ 'HVLJQ

(YDOXDWH FRPSHWLQJ GHVLJQV EDVHG RQ GDWD DQG SHUIRUPDQFH RQ
GHWHUPLQH WKH EHVW VROXWLRQ PHHW WKH FULWHULD DQG FRQVWUDL

06 (76 (QJLQHHULQJ 'HVLJQ

$QDO\]H GDWD IURP WHVWV WR GHWHUPLQH VLPLODULW
VHYHUDO GHVLJQ VROXWLRQV WR LGHQWLI\ WKH EHVW
FRPELQHG LQWR D QHZ VROXWLRQ WKDW FRQWDLQV XQLTXH

06 (76 (QJLQHHULQJ 'HVLJQ

'HYHORS D PRGHO WR JHQHUDWH GDWD IRU LWHUDWLYH
SURSRVHG REMHFWV XVLQJ WKH DSSURSULDWH GHVLJQ FD

06 (66 (DUWK DQG +XPDQ $FWLYLW\

$SSO\ VFLHQWLILF SULQFLSOHV WR GHVLJQ D PHWKRG
KXPDQ LPSDFW RQ WKH HQYLURQPHQW

+6 (66 (DUWK DQG +XPDQ $FWLYLW\

(YDOXDWH RU UHILQH D WHFKQRORJLFDO VROXWLRQ WR
DFWLYLWLHV RQ QDWXUDO V\VWHPV

+6 (76 (QJLQHHULQJ 'HVLJQ

'HVLJQ D VROXWLRQ WR D FRPSOH[UHDO ZRUOG SUREO
VPDOOHU PRUH PDQDJHDEOH SUREOHPV WKDW FDQ EH

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+6 (76 (QJLQHHULQJ 'HVLJQ

(YDOXDWH D VROXWLRQ WR D SUREOHP EDVHG RQ SULRU
DQG WUDGH RIIV WKDW DFFRXQW IRU D UDQJH RI FRQV
UHOLDELOLW\ DQG DHVWKHWLFV DV ZHOO DV SRVVLEO
LPSDFWV

+6 (76 (QJLQHHULQJ 'HVLJQ

8VH D FRPSXWHU VLPXODWLRQ WR PRGHO WKH LPSDFW
FRPSOH[UHDO ZRUOG SUREOHP ZLWK QXPHURXV FULWH
LQWHUDFWLRQV ZLWKLQ DQG EHWZHHQ V\VWHPV UHOHY

'&, (76 $ (QJLQHHULQJ 'HVLJQ 'HILQLQJ DQG 'HOLPLWL

&ULWHULD DQG FRQVWUDLQWV DUH LQWHJUDO WR WKH GHV
VXFFHVVIXO LVVXHV RI ULVN PLWLJDWLRQ DQG HW
TXDQWLILHG WR WKH H[WHQW SRVVLEOH DQG VWDWHG
JLYHQ GHVLJQ PHHWV WKHP VHFRQGDU\ WR +6 36

'&, (76 % (QJLQHHULQJ 'HYHORSLQJ oö•0xÐ`G&pE

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) 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
WHFKQRORJ\

) 1HZURGXFWV DQG HQJLQHHULQJ SURFHVVHV RI WKH KHOS GR
WKLQJV WKDW FRXOG KDYH EHHQ GRQH EHWWHU RU QHZ RQHV RI WHFKQRORJ\

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
WHFKQRORJ\

* 7KH GHYHORSPHQW RI WHFKQRORJ\ LV D KXPDQ DFWI
LQGLYLGXDO DQG FROOHFWLYH QHHGV DQG WKH DELOL

- 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
WHFKQRORJ\

- 7KH QDWXUH DQG GHYHORSPHQW RI WHFKQRORJLFDO
IXQFWLRQV RI WKH VHWWLQJ

+ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI V
GHYHORSPHQW DQG XVH RI WHFKQRORJ\

+ 'LIIHUHQW FXOWXUHV GHYHORS WKHLU RZQ WHFKQRC
DQG VKDUHG QHHGV ZDQWV DQG YDOXHV

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
DQG XVH RI WHFKQRORJ\

, 7KH GHFLVLRQ ZKHWKHU WR GHYHORS D WHFKQRORJ\
DQG GHPDQGV LQ DGGLWLRQ WR FRUSRUDWH FXOWXU

(6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

('HVLJQ LV D FUHDWLYH SODQQLQJ SURFHVV WKDW OH
V\VWHPV

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

, (VWDEOLVKHG GHVLJQ SULQFLSOHV DUH XVHG WR HYI
GDWD DQG WR JXLGH WKH GHVLJQ SURFHVV

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

3 8VH FRPSXWHUV DQG FDOFXODWRUV WR DFFHVV UHV
LQWHUSUHW DQG HYDOXDWH GDWD DQG FRPPXQLFDWH

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) 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
XVH FRQVWUXFWLRQ WHFKQRORJLHV

) 7KH VHOHFWLRQ RI GHVLJQV IRU VWUXFWXUHV LV ED
DQG FRGHV VW\OH FRQYHQLHQFH FRVW FOLPDWH D

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Civil Engineering and Architecture (CEA)

Standards for Technological Literacy

Lesson 1.2

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H
* %UDLQVWRUPLQJ LV D JURXS SUREOHP VROYLQJ GHV
LQ WKH JURXS SURSRVH LGHDV LQ DQ RSHQ IRUXP

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Civil Engineering and Architecture (CEA)

Standards for Technological Literacy

Lesson 2.2

= 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

= 6HOHFWLQJ UHVRXUFHV LQYROYHV WUDGH RIIV EHWZ
DYDLODELOLW\ FRVW GHVLUDELOLW\ DQG ZDVWH

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Civil Engineering and Architecture (CEA)

Standards for Technological Literacy

Lesson 2.3

5 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

5 5HTXLUHPHQWV DUH WKH SDUDPHWHUV SODFHG RQ W V\VWHP

6 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

6 7UDGH RII LV D GHFLVLRQ SURFHVV UHFRJQL]LQJ WK DPRQJ FRPSHWLQJ IDFWRUV

= 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI V

= 6HOHFWLQJ UHVRXUFHV LQYROYHV WUDGH RIIV EHWZ DYDLODELOLW\ FRVW GHVLUDELOLW\ DQG ZDVWH

$$ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI

$$ 5HTXLUHPHQWV LQYROYH WKH LGHQWLILFDWLRQ RI SURGXFW RU V\VWHP DQG WKH GHWHUPLQDWLRQ RI KRZ GHYHORSPHQW

%% 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI

%% 2SWLPL]DWLRQ LV DQ RQJRLQJ SURFHVV RU PHWKR SURGXFW DQG LV GHSHQGHQW RQ FULWHULD DQG FRQV

' 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W HQYLURQPHQW

' 7KH PDQDJHPHQW RI ZDVWH SURGXFHG E\ WHFKQRORJ VRFLHWDO LVVXH

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W SROLWLFDO HIIHFWV RI WHFKQRORJ\

* +XPDQV FDQ GHYLVH WHFKQRORJLHV WR FRQVHUYH Z VXFK WHFKQLTXHV DV UHXVLQJ UHGXFLQJ DQG UHF\F

+ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI V SROLWLFDO HIIHFWV RI WHFKQRORJ\

+ :KHQ QHZ WHFKQRORJLHV DUH GHYHORSHG WR UHGX @HQHUÜÃ`!–• + V + P0p€ P0p€ P0p€ DUH GHPHVRXU P URX @ FJ RI WKH FXOWXUDO VRFLDO HFRQRPLF DQG SROLWLFDO HIIHFWV RI WHFEp #•t E dÀ`RJ\

+ :KHQ QHZ WHFKQ^±#y˜ DÐ x„@ 0ƒ`5P½Ì6À0 PDÀ0F € À:K P

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/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
SROLWLFDO HIIHFWV RI WHFKQRORJ\

/ 'HFLVLRQV UHJDUGLQJ WKH LPSOHPHQWDWLRQ RI WH
RI WHFKQRORJLIV EHWZHHQ SUHGLFWHG SRVLWLYH DQG QHJDW

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W
GHYHORSPHQW DQG XVH RI WHFKQRORJ\

* 0HHWLQJ VRFLHWDO [illegible] EHKDYLRUV DQG WKH D
XVH RI SURGXFWV DQG V\VWHPV

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

* 5HTXLUHPHQWV IRU GHVLJQ DUH PDGH XS RI FULWHU

+ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI V

+ 7KH GHVLJQ SURFHVV LQFOXGHV GHILQLQJ D SUREOH
DQG JHQHUDWLQJ LGHDV LGHQWLI\LQJ FULWHULD DQG
SRVVLELOLWLHV VHOHFWLQJ DQ DSSURDFK GHYHORSL
PRGHO RU SURWRW\SH

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

, 'HVLJQ SUREOHPV DUH VHOGRP SUHVHQWHG LQ D FOH

- 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

- 7KH GHVLJQ QHHGV WR EH FRQWLQXDOO\ FKHFNHG DQ
GHVLJQ PXVW EH UHGHILQHG DQG LPSURYHG

. 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

. 5HTXLUHPHQWV RI D GHVLJQ VXFK DV FULWHULD FR
VRPHWLPHV FRPSHWH ZLWK HDFK RWKHU

+ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

+ 0RGHOLQJ WHVWLQJ HYDOXDWLQJ DQG PRGLI\LQJ D
SUDFWLFDO VROXWLRQV

/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

/ 7KH SURFHVV RI HQJLQHHULQJ GHVLJQ WDNHV LQWR

+ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

+ $SSO\ D GHVLJQ SURFHVV WR VROYH SUREOHPV LQ D
FODVVURRP

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

- 0DNH WZR GLPHQVLRQDO DQG WKUHH GLPHQVLRQDO
VROXWLRQ

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, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

, (VWDEOLVKHG GHVLJQ SULQFLSOHV DUH XVHG WR HYI
GDWD DQG WR JXLGH WKH GHVLJQ SURFHVV

/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

/ 7KH SURFHVV RI HQJLQHHULQJ GHVLJQ WDNHV LQWR

+ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

+ $SSO\ D GHVLJQ SURFHVV WR VROYH SUREOHPV LQ D
FODVVURRP

, 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

, 6SHFLI\ FULWHULD DQG FRQVWUDLQWV IRU WKH GHVL

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

- 0DNH WZR GLPHQVLRQDO DQG WKUHH GLPHQVLRQDO
VROXWLRQ

. 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

. 7HVW DQG HYDOXDWH WKH GHVLJQ LQ UHODWLRQ WR
DV FULWHULD DQG

FRQVWUDLQWV DQG UHILQH DV QHHGHG

1 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

1 ,GHQWLI\ FULWHULD DQG FRQVWUDLQWV DQG GHWHU
SURFHVV

2 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

2 5HILQH D GHVLJQ E\ XVLQJ SURWRW\SHV DQG PRGHO
DQG SURGXFWLYLW\ RI WKH ILQDO SURGXFW

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

3 (YDOXDWH WKH GHVLJQ VROXWLRQ XVLQJ FRQFHSWX
PRGHOV DW YDULRXV LQWHUYDOV RI WKH GHVLJQ SURF
GHVLJQ DQG WR QRWH DUHDV ZKHUH LPSURYHPHQWV D

4 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

4 'HYHORS DQG SURGXFH D SURGXFW RU V\VWHP XVLQJ

5 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

5 (YDOXDWH ILQDO VROXWLRQV DQG FRPPXQLFDWH RE
RI WKH HQWLUH GHVLJQ SURFHVV XVLQJ YHUEDO JUDS
ZULWWHQ PHDQV LQ DGGLWLRQ WR WKUHH GLPHQVLRQ

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- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH DQ
DQG V\VWHPV

+ 8VH LQIRUPDWLRQ SURYLGHG LQ [SHQLXDOFHG SURWRF
VHH DQG XQGHUVWDQG KRZ

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

- 8VH FRPSXWHUV DQG FDOFXODWRUV LQ YDULRXV DSS

/ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

/ 'RFXPHQW SURFHVVHV DQG SURFHGXUHV DQG FRPPXQ
DXGLHQFHV XVLQJ DSSURSULDWH RUDO DQG ZULWWHQ

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

3 8VH FRPSXWHUV DQG FDOFXODWRUV WR DFFHVV UHW
LQWHUSUHW DQG HYDOXDWH GDWD DQG LQIRUPDWLRQ

- 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
XVH LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

- 7KH GHVLJQ RI D PHVVDJH LV LQIOXHQFHG E\ VXFK ID
PHGLXP SXUSRVH DQG WKH QDWXUH RI WKH PHVVDJH

. 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI DQG EH DEO
XVH LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

. 7KH XVH RI V\PEROV PHDVXUHPHQWV DQG GUDZLQJV
FRPPXQLFDWLRQ WHFKQRORJLHV ODQJXDJHV H[SUHVV

3 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

3 7KHUH DUH PDQ\ ZD\V WR FRPPXQLFDWH LQIRUPDWLR
HOHFWURQLF PHDQV

4 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

4 7HFKQRORJLFDO NQRZOHGJH DQG SURFHVVHV DUH FR
V\PEROV PHDVXUHPHQW FRQYHQWLRQV LFRQV JUDSK
LQFRUSRUDWH D YDULHW\ RI YLVXDO DXGLWRU\ DQG V

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) 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
XVH FRQVWUXFWLRQ WHFKQRORJLHV

) 7KH VHOHFWLRQ RI GHVLJQV IRU VWUXFWXUHV LV ED
DQG FRGHV VW\OH FRQYHQLHQFH FRVW FOLPDWH D

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
FRQVWUXFWLRQ WHFKQRORJLHV

* 6WUXFWXUHHRXQGVWLRQD

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
FRQVWUXFWLRQ WHFKQRORJLHV

, %XLOGLQJV JHQHUDOO\ FRQWDLQ D YDULHW\ RI VXEV\

. 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFWLRQ WHFKQRORJLHV

. 6WUXFWXUHV DUH FRQVWUXFWHG XVLQJ D YDULHW\ F

/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFWLRQ WHFKQRORJLHV

/ 7KH GHVLJQ RI VWUXFWXUHV LQFOXGHV D QXPEHU RI

0 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFWLRQ WHFKQRORJLHV

0 6WUXFWXUHV UHTXLUH PDLQWHQDQFH DOWHUDWLRQ
LPSURYH WKHP RU WR DOWHU WKHLU LQWHQGHG XVH

1 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFWLRQ WHFKQRORJLHV

1 6WUXFWXUHV FDQ LQFOXGH SUHIDEULFDWHG PDWHUL

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3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

3 (YDOXDWH WKH GHVLJQ VROXWLRQ XVLQJ FRQFHSWX
PRGHOV DW YDULRXV LQWHUYDOV RI WKH GHVLJQ SURF
GHVLJQ DQG WR QRWH DUHDV ZKHUH LPSURYHPHQWV D

4 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

4 'HYHORS DQG SURGXFH D SURGXFW RU V\VWHP XVLQJ

5 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

5 (YDOXDWH ILQDO VROXWLRQV DQG FRPPXQLFDWH REV
RI WKH HQWLUH GHVLJQ SURFHVV XVLQJ YHUEDO JUDS
ZULWWHQ PHDQV LQ DGGLWLRQ WR WKUHH GLPHQVLRQ

+ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

+ 8VH LQIRUPDWLRQ SURYLGHG LQ PDQXDOV SURWRFR
VHH DQG XQGHUVWDQG

KRZ WKLQJV ZRUN

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

- 8VH FRPSXWHUV DQG FDOFXODWRUV LQ YDULRXV DSS

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

3 8VH FRPSXWHUV DQG FDOFXODWRUV WR DFFHVV UHW
LQWHUSUHW DQG HYDOXDWH GDWD DQG LQIRUPDWLRQ

) 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
XVH FRQVWUXFWLRQ WHFKQRORJLHV

) 7KH VHOHFWLRQ RI GHVLJQV IRU VWUXFWXUHV LV EDV
DQG FRGHV VW\OH FRQYHQLHQFH FRVW FOLPDWH D

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
XVH FRQVWUXFWLRQ WHFKQRORJLHV

* 6WUXFWXUHV RXJKW WR EH GHVLJQHG WR

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI D
FRQVWUXFWLRQ WHFKQRORJLHV

, %XLOGLQJV JHQHUDOO\ FRQWDLQ D YDULHW\ RI VXEV

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. 6WXGHQWV DQDO\]H RS DQ XQGHUVWDQGLQJ RI DQG EH DEO
FRQVWUXFW WHFKQRORJLFDO PRGHOV

. 6WUXFWXUHV DUH FRQVWUXFWHG XVLQJ SURFHVVHV DQG SURFHG

/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFW WHFKQRORJLFDO PRGHOV

/ 7KH GHVLJQ RI VWUXFWXUHV FRQVLGHUV PXOWLSOH IDFWRUV

0 6WXGHQWV DQDO\]H RS DQ XQGHUVWDQGLQJ RI DQG EH DE
FRQVWUXFW WHFKQRORJLFDO PRGHOV

0 6WUXFWXUHV DUH TXLUH PDLQWHQDQFH DOWHUDWLRQ RU U
LPSURYH WKHP RU WR DOWHU WKHLU LQWHQGHG XVH

1 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
FRQVWUXFWLRQ WHFKQRORJLHV

1 6WUXFWXUHV FDQ LQFOXGH SUHIDEULFDWHG PDWHUL

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. 6WXGHQWV GHYHORS DQ XQGHUVWDQGLQJ RI DQG EH DEOH
XVH LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

. 7KH XVH RI V\PEROV PHDVXUHPHQWV DQG GUDZLQJV
FRPPXQLFDWLRQ ODQJXDJHV H[SUHVV

3 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI
LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

1 Z3 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQ

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Civil Engineering and Architecture (CEA)

Standards for Technological Literacy

Lesson 4.1

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, 'HVLJQ SUREOHPV DUH VHOGRP SUHVHQWHG LQ D FOH

- 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

- 7KH GHVLJQ QHHGV WR EH FRQWLQXDOO\ FKHFNHG DG GHVLJQ PXVW EH UHGHILQHG DQG LPSURYHG

. 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI W

. 5HTXLUHPHQWV RI D GHVLJQ VXFK DV FULWHULD FR VRPHWLPHV FRPSHWH ZLWK HDFK RWKHU

) 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

) 'HVLJQ LQYROYHV D VHW RI VWHSV ZKLFK FDQ EH SH DQG UHSHDWHG DV QHHGHG

* 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

* %UDLQVWRUPLQJ LV D JURXS SUREOHP VROYLQJ GHV LQ WKH JURXS SURFHVV WKDW LGHDV LQ DQ RSHQ IRUXP

+ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

+ 0RGHOLQJ WHVWLQJ HYDOXDWLQJ DQG PRGLI\LQJ D SUDFWLFDO VROXWLRQV

, 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

, (VWDEOLVKHG GHVLJQ SULQFLSOHV DUH XVHG WR HYI GDWD DQG WR JXLGH WKH GHVLJQ SURFHVV

/ 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI H

/ 7KH SURFHVV RI HQJLQHHULQJ GHVLJQ WDNHV LQWR

+ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

+ $SSO\ D GHVLJQ SURFHVV WR VROYH SUREOHPV LQ D FODVVURRP

, 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

, 6SHFLI\ FULWHULD DQG FRQVWUDLQWV IRU WKH GHVL

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

- 0DNH WZR GLPHQVLRQDO DQG WKUHH GLPHQVLRQDO U VROXWLRQ

. 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO\ WKH GHVLJQ SU

. 7HVW DQG HYDOXDWH D GHVLJQ LQ UHODWLRQ WR SUH HVWDE DV FULWHULD DQG FRQVWUDLQWV DQG UHILQH DV QHH

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/ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSSO

/ 0DNH D SURGXFW RU V\VWHP DQG GRFXPHQW WKH VR

0 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

0 ,GHQWLI\ WKH GHVLJQ SUREOHP WR VROYH DQG GHFL

1 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

1 ,GHQWLI\ FULWHULD DQG FRQVWUDLQWV DQG GHWHU
SURFHVV

2 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

2 5HILQH D GHVLJQ E\ XVLQJ SURWRW\SHV DQG PRGHO
DQG SURGXFWLYLW\ RI WKH ILQDO SURGXFW

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

3 (YDOXDWH WKH GHVLJQ VROXWLRQ XVLQJ FRQFHSWX
PRGHOV DW YDULRXV LQWHUYDOV RI WKH GHVLJQ SURF
GHVLJQ DQG WR QRWH DUHDV ZKHUH LPSURYHPHQWV D

4 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

4 'HYHORS DQG SURGXFH D SURGXFW RU V\VWHP XVLQJ

5 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR DSS

5 (YDOXDWH ILQDO VROXWLRQV DQG FRPPXQLFDWH REV
RI WKH HQWLUH GHVLJQ SURFHVV XVLQJ YHUEDO JUDS
ZULWWHQ PHDQV LQ DGGLWLRQ WR WKUHH GLPHQVLRQ

+ 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

+ 8VH LQIRUPDWLRQ SURYLGHG LQ [illegible]
VHH DQG XQGHUVWDQG

- 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

- 8VH FRPSXWHUV DQG FDOFXODWRUV LQ YDULRXV DSS

3 6WXGHQWV ZLOO GHYHORS WKH DELOLWLHV WR XVH
DQG V\VWHPV

3 8VH FRPSXWHUV DQG FDOFXODWRUV WR DFFHVV UHW
LQWHUSUHW DQG HYDOXDWH GDWD DQG LQIRUPDWLRQ

. 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI DQG EH DEO
XVH LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

. 7KH XVH RI V\PEROV PHDVXUHPHQW DQG FDOFXODWLRQV
FRPPXQLFDWH [illegible]

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1 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

1 ,QIRUPDWLRQ DQG FRPPXQLFDWLRQ V\VWHPV FDQ EH HQWHUWDLQ FROt• ROR S `@pW pU-P ððWLRQ V\VWHP¨ 6WX LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

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4 6WXGHQWV ZLOO GHYHORS DQ XQGHUVWDQGLQJ RI LQIRUPDWLRQ DQG FRPPXQLFDWLRQ WHFKQRORJLHV

4 7HFKQRORJLFDO NQRZOHGJH DQG SURFHVVHV FRPPHQVXUDWH FR PHDVXUHPHQW FRQYHQWLRQV LQFRUSRUDWH LQQRYDWLRQ DQG WHFKQRORJLFDO LPSURYHPHQW

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